UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

ILLUMINA, INC., and ILLUMINA CAMBRIDGE LTD., Plaintiffs, v. BGI GENOMICS CO., LTD., BGI AMERICAS CORP., MGI TECH CO., LTD., MGI AMERICAS, INC., and COMPLETE GENOMICS INC., Defendant.	CASE NO. 3:19-cv-03770-WHO CASE NO. 3:20-cv-01465-WHO

Declaration of David Blackburn, Ph.D.

April 10, 2020

CONTAINS OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

Table of Contents

I. Introduction

A. Qualifications

1. I am an applied microeconomist and Director for NERA Economic Consulting ("NERA"), an economic consulting firm based in White Plains, New York. I am based in NERA's Washington, D.C. office. I earned a B.Sc. in Applied Mathematics and Economics from Brown University and an M.A. and Ph.D. in Economics from Harvard University. I have taught economics courses at the graduate and undergraduate levels at several institutions. I have written and spoken publicly on a number of economic issues, including intellectual property issues. At NERA, my practice has focused on the economics of intellectual property, antitrust economics, and calculating economic damages in commercial disputes; a substantial portion of my economic research over the past 15 years has involved assessing damages in patent disputes. I have also conducted analyses and provided testimony in connection with motions for injunctive relief, including analyses of irreparable harm and the impact of a proposed injunction on the balance of hardships and the public interest. My CV, including my past testimony, is provided in **Attachment 1**.

B. Assignment

2. I understand that Plaintiffs Illumina, Inc. and Illumina Cambridge LTD.[1] (collectively, "Illumina") have brought two lawsuits against Defendants BGI Genomics Co., LTD., BGI Americas Corp. (collectively, "BGI Genomics"), MGI Tech Co., LTD., MGI Americas, Inc. (collectively, "MGI"), and Complete Genomics Inc. ("Complete Genomics"), alleging infringement of U.S. Patent Nos. 7,566,537 (the "'537 patent") and 9,410,200 (the "'200 patent") in the first lawsuit and infringement of U.S. Patent Nos. 7,771,973 (the "'973 patent"),

[1] Illumina Cambridge LTD. is a wholly-owned subsidiary of Illumina, Inc. [Exhibit D93, p. "Subsidiaries of the Company."]

Exhibits cited in this declaration with exhibit numbers beginning with "D" are attached to the Declaration of Katie J.L. Scott.

7,541,444 (the "'444 patent"), and 10,480,025 (the "'025 patent") in the second lawsuit.[2, 3] I understand that, in each case, the plaintiffs filed a motion seeking a preliminary injunction.[4] Specifically, in the first case, the plaintiffs seek to prohibit the defendants from distributing their DNBSEQ sequencers and standardMPS reagents in the United States or using those products in the United States for promotional purposes until the final adjudication on the merits of Illumina's infringement claims relating to the '537 patent and the '200 patent.[5] In the second case, the plaintiffs seek to prohibit the defendants from "commercializing or using their [DNBSEQ sequencers, CoolMPS reagents, and standardMPS reagents] in the United States" until the final adjudication on the merits of Illumina's infringement claims relating to the '973 patent, the '444 patent, and the '025 patent.[6] In each case, the plaintiffs have offered a declaration of Mark Van Oene, Chief Commercial Officer at Illumina, in support of their request in that case.[7]

3. Counsel for the defendants have asked me (i) to review and respond to the economic arguments raised in the plaintiffs' motions for a preliminary injunction and Mr. Van Oene's declarations, and (ii) to assess whether Illumina will likely be irreparably harmed if the defendants distribute, commercialize, or use their allegedly infringing sequencing platforms and reagents in the United States before the trial in either case, and to provide an economic opinion

---

2 "First Amended Complaint for Patent Infringement," *Illumina, Inc., et al., v. BGI Genomics Co., LTD., et al,* U.S. District Court for the Northern District of California, Case No. 3:19-CV-03770-WHO, September 18, 2019 ("First Complaint"); "Complaint for Patent Infringement," *Illumina, Inc., et al., v. BGI Genomics Co., LTD., et al,* U.S. District Court for the Northern District of California, Case No. 3:20-CV-1465, February 27, 2020 ("Second Complaint").

3 I understand that the '537 patent expires on January 22, 2023, the '200 patent expires on August 23, 2022, the '444 patent expires on June 22, 2023, the '973 patent expires on August 23, 2022, and the '025 patent expires on August 23, 2022. I refer to these patents collectively as the Asserted Patents.

4 "Notice of Motion and Memorandum in Support of Plaintiffs Illumina, Inc. and Illumina Cambridge LTD.'s Motion for Preliminary Injunction," *Illumina, Inc., et al., v. BGI Genomics Co., LTD., et al,* U.S. District Court for the Northern District of California, Case No. 3:19-CV-03770-WHO, February 19, 2020 ("First PI Motion"); "Notice of Motion and Memorandum in Support of Plaintiffs Illumina, Inc. and Illumina Cambridge LTD.'s Motion for Preliminary Injunction," *Illumina, Inc., et al., v. BGI Genomics Co., LTD., et al,* U.S. District Court for the Northern District of California, Case No. 3:20-CV-1465, February 27, 2020 ("Second PI Motion").

5 First PI Motion, p. 1.

6 Second PI Motion, pp. 1, 3, 15.

7 "Declaration of Mark Van Oene in Support of Plaintiffs Illumina, Inc. and Illumina Cambridge LTD.'s Motion for Preliminary Injunction," Case No. 3:19-CV-03770-WHO, February 19, 2020 ("First Van Oene Declaration"); "Declaration of Mark Van Oene in Support of Plaintiffs Illumina, Inc. and Illumina Cambridge LTD.'s Motion for Preliminary Injunction," Case No. 3:20-CV-1465, February 27, 2020 ("Second Van Oene Declaration").

regarding how the defendants' distribution, commercialization, and use of those products in the United States would affect public interest and how a preliminary injunction would affect the balance of hardship.

4. NERA was retained by counsel according to our ordinary retention terms. That is, NERA bills on an hourly basis, with out-of-pocket expenses billed separately at cost. Charges are based on time actually spent; my hourly time is billed at $675 per hour. Neither my nor NERA's compensation depends in any way on the outcome of my analyses or of this case.

C. Information Considered

5. In preparing this declaration, I and economists working under my direction have reviewed information from a variety of sources. These include: (i) pleadings and other court documents submitted in the two cases, (ii) documents and data produced by the parties in connection with those cases, (iii) the transcript of the deposition of Mr. Van Oene, and (iv) publicly available materials. A complete list of the materials that I have considered in connection with my analysis in this matter is provided in **Attachment 2**. In addition, I have relied upon my experience and training as an applied microeconomist and my experience in the economic analysis of markets and the determination of economic damages.

D. Summary of Opinions

6. My research and analyses are continuing and, while I do not expect to change my methodology or general approach, I reserve the right to revise my opinions to the extent I receive and consider additional information, or if additional research or reflection leads me to change my opinions. Based on my analysis to date, the following is a summary of my opinions:

(i) Illumina is unlikely to suffer irreparable harm as a result of the distribution, commercialization, and/or use of the defendants' allegedly infringing sequencing products between now and the trial in either case. That is because Illumina will likely be able to be fully compensated for its potential economic harm, if any, with monetary damages at the time that a verdict is reached at trial. Such economic harm is likely to be quantifiable and calculated to a reasonable degree of certainty using data that will be readily available at the time of trial. Indeed,

economists including myself often calculate economic damages in patent infringement matters that makes the plaintiff(s) whole.

(ii) Illumina's assertions that it will suffer irreparable harm are unavailing. Illumina's assertion of reputational harm is simply a restatement of its claim that it will suffer lost profits from lost sales and price erosion, which are likely to be quantifiable. Moreover, marketplace realities, Illumina's own admissions, and the small number of customers that the defendants aim to obtain in the next two years all demonstrate that it will be possible to identify any profits that Illumina may lose from lost sales and price erosion as a result of the alleged infringement.

(iii) There is no economic reason to believe that the balance of hardship favors a preliminary injunction. A preliminary injunction would result in the defendants losing sales and profits that they would otherwise make before trial. A delay in the entry of the defendants' allegedly infringing products resulting from a preliminary injunction would further enhance Illumina's first-mover advantage and disadvantage the defendants when they are permitted to enter the marketplace, resulting in harm to the defendants (and to consumers). Absent a preliminary injunction, any harm possibly suffered by Illumina by the alleged infringement would be fully compensable at a later date and given the limited nature of defendants' sales goals, any such harm is likely to be relatively small.

(iv) A preliminary injunction would not serve the public interest. Again, absent a preliminary injunction, any harm possibly suffered by Illumina by the alleged infringement would be fully compensable at a later date. In contrast, if a preliminary injunction were granted, the harm suffered by consumers who would be denied access to alternative DNA sequencing products that are more affordable than and differentiated from Illumina's products would never be remedied.

II. Background

A. The Parties and Products at Issue

1. Illumina and Its Next Generation Sequencing Products

7. Illumina represents itself as "the global leader in sequencing- and array-based solutions for genetic and genomic analysis."[8] In 2019, Illumina's worldwide revenue was $3.5 billion, of which about 87 percent was from sales of Illumina's next generation sequencing ("NGS") products and services.[9] According to Illumina, its NGS technology, also referred to as Solexa sequencing and massively parallel sequencing ("MPS"), generates DNA sequencing data by "tracking the addition of labeled nucleotides as the DNA chain is copied" and is faster and more scalable than previous methods of DNA sequencing such as "Sanger chain-termination" and "microarrays."[10]

8. Illumina markets and sells a series of NGS platforms that vary in throughput.[11] Specifically, it markets and sells three series of benchtop sequencers: iSeq100, MiniSeq, and MiSeq Series, capable of producing 1.2 Gb to 15 Gb of data per run.[12] Illumina also offers production-scale sequencers, with throughput ranging from 120 Gb per run (*i.e.*, NextSeq 550 Series[13]) to 6,000 Gb per run (*i.e.*, NovaSeq 6000).[14] According to Mr. Van Oene, an Illumina NGS platform generally lasts three to five years before they need to be replaced.[15]

---

[8] Exhibit D93, p. 4.

[9] Exhibit D93, p. 59.

[10] Exhibit D97. *See also* Exhibit D93, p. 5; First Van Oene Declaration, ¶8; Second Van Oene Declaration, ¶¶5 and 8.

[11] Exhibit D98; Exhibit D43 at ILMNBGI0026154 ("Throughput is the quantity of DNA bases a sequencer can sequence within a given timeframe.").

[12] Exhibit D98.

[13] The NextSeq 550 Series is considered both a benchtop and a production-scale sequencing platform. [Exhibit D98.]

[14] Exhibit D98.

[15] First Van Oene Declaration, ¶29; Second Van Oene Declaration, ¶32.

9. Besides sequencing platforms, Illumina sells sequencing kits and reagents (also known as "consumables") to its customers of NGS platforms.[16] According to Mr. Van Oene, for "technical and contractual reasons," Illumina's reagents "cannot be used with non-Illumina sequencing platforms," and "non-Illumina reagents cannot be used with Illumina sequencers."[17] In addition to consumables, Illumina may also provide sequencing and product support services to its customers of sequencing platforms.[18]

10. Therefore, within a three-to-five-year period, customers of Illumina's NGS systems generally incur (i) a one-time fixed cost of purchasing an Illumina NGS platform and (ii) recurring costs for purchasing consumables and services. Indeed, Illumina's revenue from sales of consumables exceeds its revenue from sales of sequencing platforms. For example, in 2019, Illumina's NGS sequencing platform sales represented 15 percent of Illumina's total revenue, and its NGS consumable sales represented 59 percent of Illumina's total revenue.[19] Securities analysts predict that, through 2021, Illumina's revenues from sales of consumables will continue to grow and represent a greater percentage of Illumina's total revenue from sales of NGS products and related services.[20]

2. BGI Genomics, MGI, Complete Genomics, and Their DNA Sequencing Products

11. BGI Genomics, MGI, and Complete Genomics are subsidiaries of the BGI Group,[21] which made about $377 million in total revenue in 2018.[22] I understand that BGI

---

[16] Exhibit D93, p. 7. *See also* First Van Oene Declaration, ¶12; Second Van Oene Declaration, ¶13.

[17] First Van Oene Declaration, ¶12; Second Van Oene Declaration, ¶13. I understand that Illumina may enter into partnerships with third parties to supply reagents for Illumina's NGS platform. For example, in 2019, three years after Qiagen was enjoined from launching its GeneReader NGS system in the U.S., Qiagen announced that it entered into a long-term partnership with Illumina, and that it would develop kits for Illumina's NGS platforms and stop developing its own NGS platforms. [Exhibit D99; Exhibit D37.] [*See also* Exhibit D100.]

[18] Exhibit D93, p. 7. *See also* First Van Oene Declaration, ¶12; Second Van Oene Declaration, ¶13.

[19] Exhibit D93, p. 59.

[20] See, *e.g.*, Exhibit D44 at ILMNBGI00272277, ILMNBGI0027284.

[21] Exhibit D101.

[22] Exhibit D80 at ILMNBGI1085513.

Genomics provides DNA and genomics services,[23] that MGI manufacturers and sells sequencing platforms and consumables,[24] and that Complete Genomics is a research and development center of MGI.[25]

12. MGI manufactures and sells high-throughput NGS sequencing platforms and reagents.[26] Specifically, its DNBSEQ sequencing platforms have throughput capacity ranging from 15 Gb per run to 6,000 Gb per run.[27] MGI also offers sequencing reagents and reagent kits, including the standardMPS and CoolMPS products.[28] In February 2020, MGI announced that it would make two of its DNBSEQ sequencing platforms (*i.e.*, DNBSEQ-G400 and DNBSEQ-T7) and the corresponding CoolMPS reagent kits commercially available in the United States starting in April 2020.[29] DNBSEQ-G400 has a throughput ranging from 27.5 Gb to 1,440 Gb, and DNBSEQ-T7 has a throughput ranging from 1 Tb to 6 Tb.[30] I understand that MGI does not currently plan on selling standardMPS reagents in the United States; rather, it may provide its DNBSEQ-G400RS sequencing platform with standardMPS reagents to a handful of key opinion leaders ("KOLs") in the United States.[31] I also understand that MGI's reagents cannot be used on Illumina's NGS platforms, and Illumina's reagents cannot be used on MGI's NGS platforms.

13. I understand that Illumina alleges in the first lawsuit that, among other things, the use of the defendants' DNBSEQ platforms with standardMPS reagents infringes the '537 patent and the '200 patent.[32] I understand that, in the second lawsuit, Illumina alleges, among other things, that the defendants' standardMPS reagents and CoolMPS reagents infringe the '444 patent and the '973 patent and that the use of the defendants' DNBSEQ platforms with

---

[23] Exhibit D102.

[24] Exhibit D103.

[25] Exhibit D104.

[26] Exhibit D103.

[27] Second Van Oene Declaration, Exhibit S, at slide 120.

[28] Exhibit D105.

[29] Exhibit D106; Exhibit D89 at CGI000045306.

[30] Second Van Oene Declaration, Exhibit S, at slide 120.

[31] Second Van Oene Declaration, Exhibit FF, p. 7.

[32] First Complaint, ¶¶37-44.

standardMPS reagents infringes the '025 patent.[33] In this declaration, I refer to the defendants' standardMPS reagents, CoolMPS reagents, and DNBSEQ sequencing platforms collectively as the "accused DNBSEQ products." When necessary, I refer to the defendants' DNBSEQ sequencing platforms and standardMPS reagents as the "standardMPS products," and the defendants' DNBSEQ sequencing platforms and the CoolMPS reagents the "CoolMPS products."

B. Key Marketplace Realities Regarding the Products at Issue

14. Illumina has been the dominant player in the marketplace for DNA sequencing (which includes instruments, consumables, and services related to sequencing DNA).[34] In both 2015 and 2016 Illumina's sales of its DNA sequencing products and services accounted for 76 percent of the total worldwide sales of DNA sequencing products and services.[35] Illumina was followed by Thermo Fisher, capturing 19 percent and 18 percent of the worldwide sales of DNA sequencing products and services in 2015 and 2016, respectively.[36] As the following chart in Illumina's 2019-2021 strategic plan shows, other suppliers of sequencing platforms include the

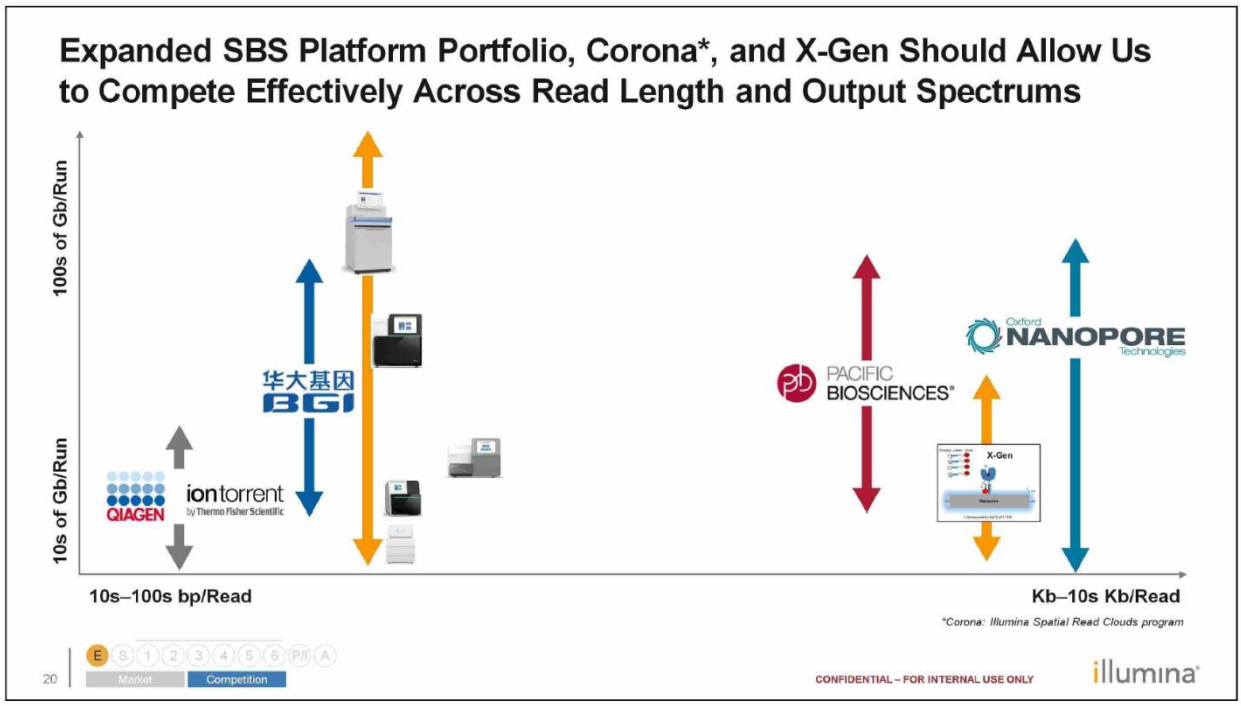
[33] Second Complaint, ¶¶44, 75, 156, 245; Second Van Oene Declaration, ¶10.

[34] Exhibit D68 at ILMNBGI0050319; Second Van Oene Declaration, Exhibit D, p. 67.

[35] Exhibit D43 at ILMNBGI0026153.

[36] Exhibit D43 at ILMNBGI0026153.

defendants, Pacific Biosciences, and Oxford Nanopore.[37] According to Illumina, Pacific Biosciences and Oxford Nanopore offer long-read sequencing technologies;[38] Thermo Fisher, with its Ion Torrent series, and the defendants offer short-read sequencing technologies;[39] and Illumina currently offers short-read sequencing technologies and is developing long-read



sequencing technologies.[40] Mr. Van Oene testified that Illumina and the defendants are the only two suppliers of high-throughput short-read sequencing platforms and that high-throughput short-read sequencing platforms make whole genome sequencing feasible and affordable.[41]

15. As of the time of this declaration, Illumina is the only supplier of high-throughput short-read platforms *in the United States*.[42] I understand that the defendants would become the

[37] Exhibit D46 at ILMNBGI0032450.

[38] Second Van Oene Declaration, Exhibit D, p. 76; Exhibit D46 at ILMNBGI0032449-ILMNBGI0032450.

[39] Exhibit D46 at ILMNBGI0032449- ILMNBGI0032450.

[40] Exhibit D46 at ILMNBGI0032450, ILMNBGI0032477.

[41] Deposition of Mark Van Oene, April 9, 2020 ("Van Oene Deposition"), 29:5-23, 30:13-25, 31:1-7, 32:8-16.

[42] Mr. Van Oene testified that, as of now, in order to conduct whole genome sequencing, customers in the United States can (i) purchase Illumina's high-throughput platforms, (ii) send their samples to the defendants and have whole genome sequencing done outside the United States, or (iii) use Oxford Nanopore's or Thermo Fisher's technology, which he testified are not affordable for whole genome sequencing. [Van Oene Deposition, 28:15-32:16.]

second supplier of high-throughput NGS platforms *in the United States*, were they allowed to sell their DNBSEQ platforms in the United States. As noted above, MGI planned to launch two of its DNBSEQ platforms (*i.e.*, DNBSEQ-G400 and DNBSEQ-T7) in the United States.[43] In terms of throughput, those two platforms are comparable to two of Illumina's systems: NextSeq and NovaSeq 6000.[44] To the extent that customers' purchasing decisions are driven by throughput capacity, MGI would compete with only two of Illumina's six systems.[45]

16. Even though Illumina and the defendants both offer high-throughput short-read NGS platforms, documents that Illumina prepared in the ordinary course of its business suggest that Illumina considers its technology to be differentiated from the defendants' in several aspects. For example, in a document dated June 2019 in which Illumina apparently considered its investment strategies by comparing its technology to the defendants', Illumina listed the

[43] Exhibit D89 at CGI000045306.

[44] Second Van Oene Declaration, Exhibit S, at slide 120.

[45] Second Van Oene Declaration, Exhibit S, at slide 120.

following "differentiators" between its technologies and those of the defendants.[46] I include that chart below as it is shown in the document.

As the chart shows, Illumina assigned its technology higher ratings over the defendants' in data quality, genome coverage, reliability and operations maturity, cost of goods sold and gross margin, and reagent stability. [redacted] In the same document, Illumina compared its NGS platform lineups and those of the defendants in 2020, and its NGS platform lineups and those that Illumina expected that the defendants would have in 2025.[48] I include the chart below as it is shown in the document.

[46] Exhibit D48 at ILMNBGI1085304.

[47] Mr. Van Oene testified that "TAT" stands for "turnaround time." [Van Oene Deposition, 217:17-21.]

[48] Exhibit D48 at ILMNBGI1085324.

In both comparisons, Illumina expected that its and the defendants' NGS platforms would differ in performance and price.

17. It is also important, for reasons I will discuss below, to recognize that customers of NGS platforms and reagents are sophisticated research institutions and biotechnology companies. For example, Illumina's customers "include leading genomic research centers, academic institutions, government laboratories, and hospitals, as well as pharmaceutical, biotechnology, commercial molecular diagnostic laboratories, and consumer genomics companies."[49] Mr. Van Oene also testified to this effect.[50] Moreover, Mr. Van Oene testified that customers incur a substantial upfront cost to acquire a high-throughput sequencing platform.[51]

[49] Exhibit D93, p. 4.

[50] Van Oene Deposition, 108:14-17.

[51] Van Oene Deposition, 108:14-22.

III. Summary of the Plaintiffs' Claims Regarding Irreparable Harm

18. Illumina asserts that the defendants compete with Illumina directly in the marketplace for "sequencers, consumables, and services based on Illumina's patented technology."[52] Illumina alleges that the defendants' "commercialization plan in the U.S." includes "(1) distribution and sales of sequencers and CoolMPS products, (2) free giveaways of sequencers and standard MPS products on a trial basis to key opinion leaders, and (3) Defendants' own internal infringing uses to drive marketing and sales."[53] Predicated on those assertions, Illumina contends that were the defendants allowed to pursue their "commercialization plan" in the United States, it would likely suffer (i) "reputational harm," (ii) lost "sales, business opportunities, and market share," and (iii) "price erosion."[54]

19. In particular, Illumina asserts the following:

- The defendants' "commercialization plan" would "cause irreparable harm to [its] reputation as the industry leader and the only supplier of [its] industry-leading, patented technology"[55] and the KOLs' use of defendants' products would "likely cause other companies and institutions around the world to choose [the defendants'] products over Illumina's" or delay "purchases of Illumina instruments and consumables or demanding discounts."[56]

- Illumina would lose sales and business opportunities because the defendants' accused DNBSEQ products would directly compete with Illumina's products.[57] Because the United States marketplace for sequencing products and services is the largest in the world and is rapidly growing, Illumina's lost sales and lost business opportunities would be hard to quantify and therefore result in

---

[52] Second PI Motion, p. 19. *See also* Second Van Oene Declaration, ¶38.

[53] Second PI Motion, p. 18. *See also* First Van Oene Declaration, ¶46; Second Van Oene Declaration, ¶51.

[54] Second PI Motion, pp. 21-23; Second Van Oene Declaration, ¶¶49-75. *See also* First PI Motion, pp. 16-19; First Van Oene Declaration, ¶¶45-67.

[55] Second PI Motion, p. 21; Second Van Oene Declaration, ¶52.

[56] First Van Oene Declaration, ¶¶49-53; Second Van Oene Declaration, ¶¶58-60.

[57] Second Van Oene Declaration, ¶64.

irreparable harm to the plaintiffs.[58] Moreover, Illumina asserts that due to customer loyalty and a reluctance to change, "it would be more difficult for Illumina to sell products to new and existing customers once Defendants have distributed infringing products to them."[59]

- As a result of the alleged infringement, Illumina would be "forced" to offer substantial discounts in response to defendants' "commercialization plan" in the U.S. and that those discounts "would likely be irreversible" even if distribution and/or sales of defendants' accused DNBSEQ products were enjoined after the trial.[60]

20. Mr. Van Oene asserts, in one paragraph in each declaration, that all of those types of harm would be irreparable for the following reasons:[61, 62]

- Because the marketplace for DNA sequencing products is nascent, no financial records would likely exist that would help quantify the harm resulting from any business opportunities that Illumina would lose as a result of the alleged infringement.

[58] Second PI Motion, p. 22; Second Van Oene Declaration, ¶65. *See also* First PI Motion, p. 18.

[59] Second PI Motion, p. 22. *See also* First PI Motion, p. 18; First Van Oene Declaration, ¶¶58-61; Second Van Oene Declaration, ¶¶66-69.

[60] Second PI Motion, p. 23. *See also* First PI Motion, pp. 18-19; First Van Oene Declaration, ¶¶62, 65-67; Second Van Oene Declaration, ¶¶73-74.

[61] First Van Oene Declaration, ¶68; Second Van Oene Declaration, ¶76.

[62] Illumina has not argued in its motion that the defendants would not be able to satisfy a monetary judgement. However, Mr. Van Oene claims that MGI may not be able to pay damages that may be awarded at trial because "it was reported that the BGI Group … only secured one-fifth of the expected amount of funding from investors" and because it was "unclear what assets MGI maintains in the U.S." [First Van Oene Declaration, ¶69; Second Van Oene Declaration, ¶78.] I note that even Mr. Van Oene recognized that MGI nonetheless raised over $200 million in that round of fundraising. [First Van Oene Declaration, ¶41; Second Van Oene Declaration, ¶45.]

- Because consumers often purchase sequencing products at irregular times and purchase reagents in bulk, it would be difficult to quantify the harm caused by lost business opportunities.[63]

- It would be difficult to quantify the full scope of Illumina's reputational harm because the market is at a "sensitive time of growth."

21. Finally, I note that Mr. Van Oene testified at deposition that it *will* be possible to identify price changes and lost sales from transactional data that Illumina keeps in the normal course of business, but it was his opinion that it would be "difficult" to attribute any changes to defendants' alleged infringement as opposed to other market conditions.[64] According to his declarations, Mr. Van Oene is the Chief Commercial Officer at Illumina and has a background in sales prior to that.[65] In particular, he has disclosed no training as an economist or as a damages expert, nor has he disclosed any experience upon which to draw inferences about how difficult it would be to assess and identify damages in a patent infringement matter. As I describe in more detail throughout this declaration, based on nearly 15 years of training and experience in assessing damages in patent infringement matters and in reviewing and assessing the work of others trained in doing so, I disagree with Mr. Van Oene—*i.e.*, he is wrong to assert that it is likely to be "difficult." There is no reasons to believe that, once identified, any lost sales or price reductions could not appropriately and reliably be attributed to the alleged patent infringement, if any, as opposed to other market conditions. Simply put, this is something that is routinely and appropriately done by those trained in assessing economic damages in patent infringement cases.

IV. Any Harm to Illumina Before Trial Resulting from the Alleged Infringement Is Not Expected to Be Substantial

22. According to the defendants' most recent launch plan, the sales goal for MGI America in the United States is to sell to [redacted] customers in 2020 (a total of [redacted] sequencing

[63] This contention was not included in ¶68 of the First Van Oene Declaration, though ¶30 mentions bulk purchasing. [First Van Oene Declaration, ¶¶30, 68.]

[64] Van Oene Deposition, 199:16-200:24.

[65] See, *e.g.*, First Van Oene Declaration, ¶3.

platforms[66]) and make [redacted] million in total revenue.[67] MGI America's sales goal for 2021 is "[to] sign additional [redacted] for repeat business" and make [redacted] million in sales revenue.[68] In addition, I understand that the defendants may provide a limited number of the accused DNBSEQ sequencers on a free trial basis and/or may provide a limited number of the accused standardMPS and CoolMPS reagents for validation and/or comparison purposes to at most five KOLs.

23. Those sales goals, together with Illumina's projected sales and the number of Illumina's existing customers, suggest that any lost sales as a result of the defendant's alleged infringement would result in minimal, if any, impact to Illumina's revenues. In its "Strategic Plan" for 2020 through 2022, Illumina estimated that it would have obtained over [redacted] cumulative customers by 2019 (or about over [redacted] "instrument owners").[69] MGI America's sales goal for 2020 is less than [redacted] of Illumina's estimated number of instrument owners in 2019[70] and less than [redacted] of Illumina's estimated cumulative number of customers in 2019.[71] In addition, Illumina expected that it would make about [redacted] in revenue in 2020 from sales of sequencing consumables and instruments, of which about [redacted] would come from sales of its high-throughput sequencing consumables and instruments.[72] A simple calculation shows that MGI America's sales revenue goal for 2020 is about [redacted] of Illumina's projected revenue from sales of its high-throughput sequencing consumables and instruments in 2020.[73]

---

66 Exhibit D89 at CGI000045306.

67 Exhibit D75 at CGI000043149, CGI000043158.

68 Exhibit D75 at CGI000043164-CGI000043165.

69 According to Illumina, the number of cumulative customers is calculated [redacted] [Exhibit D52 at ILMNBGI1066562.] By the end of 2018, Illumina had an installed bases of about [redacted] of MGI America's sales goal for sequencing platforms for 2020 (*i.e.*, [redacted] [Second Van Oene Declaration, Exhibit D, p. 67.]

[redacted]

72 Exhibit D71 at ILMNBGI1045078.

[redacted]

24. I note that the Illumina estimates that I discuss in the previous paragraph are for Illumina's worldwide sales; I am not aware of any Illumina documents that discuss its projected sales or sales revenues in the United States in 2020 and 2021.[74] However, because about 50 to 60 percent of Illumina's sales revenues of its sequencing products are made from sales in the United States,[75] there is no reason to believe that MGI America's sales goals for 2020 would not be similarly minimal compared to the number of customers that Illumina has in the United States or its projected sales in the United States in 2020. I am also not aware of any Illumina projections for its sales or sales revenues in 2021, but, again, there is no reason to believe that MGI America's sales goal for 2021 would not be minimal compared to the number of customers that Illumina has in the United States or its projected sales for the United States in 2021. As I describe in the next section, even this relatively small amount of potential harm to Illumina would not be irreparable.

V. Any Harm to Illumina Resulting from the Alleged Infringement Would Not Be Irreparable

A. Economic Framework Within Which to Assess Whether Any Harm to Illumina Would Be Irreparable

25. I understand that, as a legal matter, whether the plaintiffs are *likely* to suffer irreparable harm without a preliminary injunction is one of the considerations for determining whether a preliminary injunction—*i.e.*, enjoining the alleged infringement by the defendants until adjudication on the merits of the plaintiffs' patent claims—is appropriate. I understand that the trial for the first lawsuit is scheduled for May/June 2021; that the trial for the second lawsuit has not yet been scheduled but will likely be scheduled for no later than 2021; and that because

[74] Mr. Van Oene apparently testified that Illumina expected that it would sell over [redacted] NovaSeq platforms in the United States in 2020. [Van Oene Deposition, 43:11-23.] Illumina's expected sales of its NovaSeq platforms alone are substantially more than the defendants' sales goals in the United States for 2020.

[75] Mr. Van Oene testified that "probably closer to 60 percent than 50 percent" of Illumina's overall sequencing revenue is from sales in the United States, and that this percentage is "quite consistent" because Illumina's "business is big enough now." [Van Oene Deposition, 44:6-15]. *See also* First Van Oene Declaration, ¶28; Second Van Oene Declaration, ¶31

both will be jury trials, the decision on the merits of Illumina's patent claims will be reached immediately after.[76]

26. Therefore, as a matter of economics, the question at issue relating to irreparable harm for the consideration of a preliminary injunction is: would the defendants' distribution of their accused DNBSEQ products and sale of their CoolMPS products between now and the trial *likely* result in irreparable harm to Illumina? From an economics perspective, the economic injury that Illumina may suffer as a result of the alleged infringement is the difference between its profit (and the attendant financial position) in a world with the alleged infringement and its profit (and the attendant financial position) absent the alleged infringement. This, in turn, has two implications.

27. The first implication is that "reputational harm" exists only to the extent a change in Illumina's reputation resulting from the alleged infringement would, in the first instance, cause Illumina to lose profits either through lost sales or price concessions.[77] To that end, Illumina has not offered any economic reason or adduced any evidence for why the defendants' "commercialization plan" would "cause irreparable harm to [its] reputation as the industry leader and the only supplier of [its] industry-leading, patented sequencing technology" beyond the simple assertion that competition from the defendants' products may cause Illumina to lose sales and/or have to offer price concessions.[78] Indeed, as noted above, customers of NGS platforms and reagents are sophisticated customers, including research institutions, hospitals, clinic laboratories, and biotechnology companies, and there is no economic reason to believe that a purported change in their perception of whether Illumina is the "leading" supplier of NGS technologies would, by itself, dissuade those customers from purchasing Illumina products that

[76] I understand that the trial schedule is not finalized and could be further delayed. Regardless, either an earlier or a later trial would not materially affect my opinions and conclusions as described in this declaration.

[77] Indeed, even according to Illumina, harm associated with the purported change in Illumina's reputation as a result of the alleged infringement takes the form of lost sales and/or price erosion. [See, *e.g.*, First Van Oene Declaration, ¶¶50-51; Second Van Oene Declaration, ¶¶57-58.]

[78] Second PI Motion, p. 21. *See also* Second Van Oene Declaration, ¶52.

they would otherwise purchase at the price that they would pay absent the alleged infringement.[79]

28. Moreover, Illumina has not explained why the defendants' entry in the United States would result in any material change in Illumina's reputation as the leading supplier of NGS technology in 2020 and 2021. Illumina and the defendants have both placed and sold a significant number of NGS products outside the United States.[80] The reputation that Illumina currently enjoys in the marketplace (*i.e.*, as the leading supplier of NGS technology) reflects, among other things, the global presence of and the competition between Illumina and the defendants. As I discussed above, the number of CoolMPS products that the defendants aim to sell and the number of accused DNBSEQ products that the defendants may provide as free trials in 2020 and 2021 are small compared to the number of NGS platforms and reagents that Illumina expects to sell in those two years, let alone compared to all the systems Illumina has previously installed with customers. As such, there is little economic reason to believe that the defendants' entry *in the United States* would materially change Illumina's reputation as being the leading supplier of NGS technology in 2020 and 2021.

29. Even if, for the sake of argument, one assumes that the defendants' alleged infringement would indeed affect Illumina's reputation in the marketplace, as long as consumers purchase Illumina's products at the same price as they otherwise would absent the alleged infringement, Illumina would suffer no reduction in profits—and thus no harm—from its hypothetical loss of reputation. To the extent that any such change in Illumina's reputation would cause consumers to buy fewer Illumina products or do so at a lower price than they would absent the alleged infringement, such harm would be considered as a part of lost sales and price erosion, which I will address below. Simply put, as a for-profit company, any impact on Illumina's reputation can only cause harm by reducing Illumina's profits. Indeed, Mr. Van Oene

[79] Illumina has also not provided any economic reason or adduced any evidence for why the defendants' allegedly infringing internal uses of the patented technology would "drive marketing and sales" before patent expiration and thereby result in harm to Illumina. Indeed, because Complete Genomics only uses the accused DNBSEQ products for research and development, a process that is inherently uncertain in its outcome, Illumina's assertion that such use would result in harm to Illumina is entirely speculative. [Second Van Oene Declaration, ¶56.]

[80] See *e.g.*, Second Van Oene Declaration, Exhibit T, at slide 8; Second Van Oene Declaration, Exhibit D, p. 67; First Van Oene Declaration, ¶28; Second Van Oene Declaration, ¶31.

himself claims that the risk from a decline in Illumina's reputation and an increase in defendants' reputation is that it would "encourage others in the field to use [defendants'] sequencers, reagents, and services instead of Illumina's competing products and services."[81] Illumina's assertion of reputational harm is nothing more than a restatement of its claim that it will suffer lost profits.

30. The second implication is that if any injury that Illumina may suffer as a result of the alleged infringement is quantifiable and if the defendants have the financial means to compensate Illumina for that infringement, a monetary remedy can return Illumina to the financial condition that it would hold absent the alleged infringement and thereby make Illumina "whole."[82] Lost profits via lost sales and price erosion are routinely identified and quantified in patent infringement cases, and Illumina offers no credible explanation for why the facts in this case indicate otherwise. In the remainder of this section, I explain further why there is unlikely to be any irreparable harm to Illumina.

B. Any Economic Harm to Illumina Resulting from the Alleged Infringement Will Be Readily Calculable

1. Lost Profits from Potential Lost Sales Between Now and the Trial Are Calculable

31. Illumina contends that because the defendants' accused DNBSEQ products would be priced below Illumina's products, the defendants' distribution of their accused DNBSEQ products and the sale of their CoolMPS products would result in the plaintiffs losing sales that they would otherwise make absent the alleged infringement.[83] Illumina's argument is predicated on the assumption that the defendants' distribution of their accused DNBSEQ products and the sale of their CoolMPS products in the United States would necessarily take sales away from Illumina.

---

[81] First Van Oene Declaration, ¶50; Second Van Oene Declaration, ¶57. *See also* First Van Oene Declaration, ¶51; Second Van Oene Declaration, ¶58.

[82] As I noted above in footnote 62, while Mr. Van Oene expresses a concern that MGI may not be able to pay a monetary judgement, Illumina itself does not make such a claim in its motions for a preliminary injunction.

[83] Second PI Motion, p. 22; Second Van Oene Declaration, ¶64.

32. However, Illumina has not shown that the customers who are currently using its products (*i.e.*, existing customers) would switch to the defendants' accused DNBSEQ products as a result of the alleged infringement. In fact, Mr. Van Oene states that customers "tend to show significant loyalty to their initial supplier and are reluctant to change sequencing instruments once they become accustomed to them."[84] If that is indeed the case, there is little prospect that customers who are currently using Illumina products, including customers whose Illumina NGS platform is at the end of its life cycle and are therefore in need of a new sequencing platform, would switch to the defendants' accused DNBSEQ products.[85] And, of course, if any customers do switch from Illumina's products to the defendants', it will be a simple task to identify those customers and calculate the resulting harm to Illumina.

33. Illumina has also not established that customers who had not purchased Illumina's NGS platforms but would purchase the defendants' CoolMPS products (*i.e.*, new customers) would necessarily represent lost sales to Illumina. Economics teaches us that the entry of a differentiated and/or more affordable product could result in market expansion—*i.e.*, the defendants' CoolMPS products may be particularly appealing to certain customers due to price and/or attributes that are different from Illumina's NGS products. Indeed, in documents that Illumina prepared in the ordinary course of its business, Illumina recognized that customers of NGS products "demonstrate high price elasticity of demand,"[86] that "[m]ajor price drops have acted as market and application catalysts,"[87] and that "[b]y every measure—from number of customers to instruments to data—volume is up as price is down."[88] New customers who purchased the defendants' CoolMPS products because of their lower prices and/or differentiated features might not purchase Illumina's NGS products even absent the alleged infringement.[89]

---

84 Second Van Oene Declaration, ¶70. *See also* First Van Oene Declaration, ¶29.

85 According to Illumina, its NGS platforms can use only its reagents; therefore, if Illumina does not lose any sales of NGS platforms as a result of the alleged infringement, it will not lose any reagent sales. [First Van Oene Declaration, ¶12; Second Van Oene Declaration, ¶13.]

86 Exhibit D55 at ILMNBGI0049796.

87 Exhibit D72 at ILMNBGI1070274.

88 Indeed, Illumina expects that the reduction in the price of sequencing technologies will continue to increase the adoption and use of those technologies. [Exhibit D52 at ILMNBGI1066637.]

89 In fact, I understand that instead of purchasing NGS platforms and reagents, customers can send out their samples to be tested off site by a sequencing service provider. [See, for example, Exhibit D107 ("NGS hardware

Therefore, without further analysis of those customers, there is no economic reason to presume, *ex ante*, that sales of the defendants' CoolMPS products would necessarily be obtained by Illumina absent the alleged infringement.[90] This uncertainty, as of now, does not mean that this harm will be irreparable. The question is whether or not it will be identifiable at the time of trial.

34. At the time of trial, the defendants' own sales data will allow for the identification of any allegedly infringing sales made to new customers.[91] As noted above, the defendants aim to distribute and/or sell their accused DNBSEQ products to a small number of customers before trial. As such, it will be straightforward to identify which of those are new NGS customers and determine if they would have purchased from Illumina absent the alleged infringement.[92] As noted above, this kind of analysis is routine in patent infringement matters, and damages awards based on this straightforward methodology—identifying allegedly infringing sales and identifying which of those sales represent lost sales to the plaintiff—are routinely awarded to make the plaintiff(s) whole. Indeed, as I have noted above, Mr. Van Oene testified that Illumina "would have transactional level data to look at [average selling price] changes or specific lost sales."[93]

35. For those same reasons, Illumina's contention that because the marketplace for NGS platforms and the associated products and services is "rapidly growing" Illumina's lost

---

implementation requires substantial investment in infrastructure. Alternatively, this task can be outsourced to a commercial third party provider.")]. *See also* Van Oene Deposition, 122:3-9.

90 Mr. Van Oene also asserts that customers "tend to show significant loyalty to their initial supplier and are reluctant to change sequencing instruments once they become accustomed to them," so "it would be more difficult for Illumina" to sell products to new and existing customers once the defendants have distributed infringing products to them. [First Van Oene Declaration, ¶¶29, 62; Second Van Oene Declaration, ¶¶32, 70.] Again, this assertion assumes, without any support, that the customers who would buy the defendants' CoolMPS products would necessarily buy Illumina's products absent the alleged infringement.

91 Mr. Van Oene testified that Illumina keeps both customer-level transaction data and a tracking of its potential sales in the ordinary course of its business. [Van Oene Deposition, 20:24-21:24, 22:6-14.]

92 For example, Mr. Van Oene states as to competition outside of the United States, Illumina "received feedback that Illumina did not win [a contract with the Department of Health in Abu Dhabi] because MGI/BGI had offered a lower price." [First Van Oene Declaration, ¶57; Second Van Oene Declaration, ¶65.] This type of direct insight into customer decision making is not available in many patent infringement cases in which the plaintiffs are nonetheless routinely made whole through a damages award of lost profits. That it is available in this industry and will likely be available at trial makes it even more clear that any damages to Illumina will be calculable.

93 Van Oene Deposition, 200:17-18.

profits from lost sales before the trial cannot be quantified is also wrong as a matter of economics.[94] Economic tools which are well-established, laid out in the case law, and commonly used in assessing patent infringement damages are readily available to isolate the effects of changes in the marketplace from the effects of the alleged infringement. Even if direct evidence of competition on a customer-by-customer basis were not available (which is unlikely, given that Illumina and the defendants would likely be the only competitors for high-throughput sequencers), because Illumina has a long sales history in the United States, it is possible to use Illumina's historical sales data to calculate changes in sales volume as a result of the alleged infringement while controlling for the changes in the marketplace that would occur absent the alleged infringement.[95] Once identified—as Mr. Van Oene has noted will be possible[96]—these data can be used alongside standard economic tools to reliably determine the effect of the defendants' entry on Illumina's sales and profits in order to compensate it for the profits it lost from any potential lost sales due to the defendant's entry, as opposed to other market conditions, at trial.

2. Lost Profits from Potential Price Erosions Between Now and the Trial Are Calculable

36. As noted above, Illumina asserts that defendants' "commercialization plan" would "force[]" Illumina to offer substantial discounts in response.[97] However, I am not aware of any documents that Illumina prepared in the ordinary course of its business in which Illumina contemplated offering price discounts in response to a potential entry by the defendants in the United States. Indeed, evidence suggests that Illumina might not intend to capture customers who would opt for a more affordable sequencing option. For example, in a June 2019 planning

---

94 Second PI Motion, p. 22; Second Van Oene Declaration, ¶65.

95 Illumina keeps in the ordinary course of its business sales, cost, and profit data. [See *e.g.*, Exhibit D81, Exhibit D82, Exhibit D83, Exhibit D84, Exhibit D85, Exhibit D86, Exhibit D87, Exhibit D88.]

96 Van Oene Deposition, 199:16-200:18.

97 Second PI Motion, p. 21; Second Van Oene Declaration, ¶52, 59.

document, Illumina stated that it "should be the premium sequencing product that wins the high value genomics deals," while "competitors will service the low-profit end of the market."[98, 99]

37. There is also no economic reason to suppose that any profits that Illumina might lose from having to offer further price concessions as a result of the alleged infringement, if any, cannot be quantified. Because the products-at-issue are not "off-the-shelf" items, but rather represent investments of hundreds of thousands of dollars to Illumina's customers negotiated directly between Illumina and those customers, any reduction in price that Illumina may offer as a result of competition from defendants should be well documented and identifiable. Illumina's assertions about the difficulty of determining the prices for its products but for the alleged infringement are at odds with the limited data we have received so far, which indicate that prices for Illumina's products have been fairly steady over the past few years.[100] All of the necessary information to identify these sorts of harm is or will be readily available regarding the sales of Illumina's products and the defendants' CoolMPS products, including sales, revenue, and cost data, and the like, all of which are maintained by the plaintiffs and the defendants in the ordinary course of their business and will be available in this case.[101] As I noted above, Mr. Van Oene testified that Illumina "would have transactional level data to look at [average selling price] changes or specific lost sales."[102]

---

98 Exhibit D48 at ILMNBGI1085328.

99 Moreover, Mr. Van Oene testified that Illumina's pricing for its sequencers and discount schedules for its consumables do not vary by geographic regions. Mr. Van Oene also testified that Illumina's list prices for NovaSeq are "consistent" in the U.S. and in China. [Van Oene Deposition, 44:16-24, 45:9-46:9.] As such, Illumina's pricing for its NGS technologies is apparently already global in nature, and thus there is no reason to believe that it would be meaningfully changed by what appears to be a non-substantial change to the global competitive landscape.

100 For example, the list price of Illumina's NovaSeq 5000/6000 S1 Reagent Kit was $5,700 for 100 cycles in 2017, $5,700 in 2018, and $4,100 in 2019. Similarly, Illumina's NovaSeq 6000 S4 Reagent Kit was listed for $30,780 for 300 cycles from 2017 to 2019. [Exhibit D69, tab "Seq Reagents Prices".] To the extent that Illumina offers price discounts to specific customers, information regarding those discounts can be found and calculated in the transaction data and/or pricing policies. [Exhibit D40]

101 As noted above, Mr. Van Oene testified that Illumina keeps both customer-level transaction data and a tracking of its potential sales in the ordinary course of its business. [Van Oene Deposition, 20:24-21:24, 22:6-14.] *See also* Exhibit D69, tabs "Instrument Positioning," "Seq Reagents Prices," "Sample Pricing -Benchtop," and "Sample Pricing -High Output;" and Exhibit D70, Exhibit D20, and Exhibit D79 for examples of Illumina's pricing policies.

102 Van Oene Deposition, 200:17-18.

38. In fact, Illumina's own contentions demonstrate that this is something that can be easily done. Even absent the full discovery process that would occur in the litigation, Mr. Van Oene himself was able to list specific instances in which Illumina apparently made price concessions in response to competitive pressure from the defendants outside the United States.[103] He also identifies specific customers that Illumina lost to the defendants in Abu Dhabi and Canada.[104] The types of information relied upon to make these determinations for competition outside of the United States will be available at the time of trial to make similar determinations for competition inside the United States. Again, as noted above, according to the defendants' most recent launch plan, the defendants estimate that it would be able to obtain only a limited number of customers over the next several years. This, combined with the direct interactions between customers and NGS product suppliers, makes the process of identifying the behavior of these customers in the but-for world absent the defendants' entry even more straightforward than it might be in a case involving off-the-shelf products.[105]

39. Again, Illumina's contention that because the marketplace for NGS platforms and the associated products and services is "rapidly growing," Illumina's lost profits from price erosion before the trial cannot be quantified is wrong as a matter of economics.[106] As I discussed above, economic tools which are well-established, laid out in the case law, and commonly used in assessing patent infringement damages are readily available to isolate the effects of changes in the marketplace from the effects of the alleged infringement. As I also discussed above, even if direct evidence of competition on a customer-by-customer basis were not available (which, again, is unlikely because Illumina and the defendants would likely be the only competitors for high-throughput sequencers), because Illumina has a long sales history in the United States, it is

[103] First Van Oene Declaration, ¶64; Second Van Oene Declaration, ¶71.

[104] First Van Oene Declaration, ¶57; Second Van Oene Declaration, ¶65.

[105] The plaintiffs assert that because KOLs are "an important…revenue source for Illumina" and because KOLs have "sizable influence" in the marketplace, allowing the defendants to carry out their "commercialization plan" "would unfairly encourage these opinion leaders and others to use the infringing products and associated services instead of purchasing Illumina's technology." [First Van Oene Declaration, ¶¶26-28, 52; Second PI Motion, pp. 18, 22-23; Second Van Oene Declaration, ¶¶29-31, 59.] For the same reasons stated above, even if one assumes that Illumina would lose profit due to lost KOL sales as a result of the alleged infringement, those lost profits can be quantified.

[106] Second PI Motion, p. 22; Second Van Oene Declaration, ¶65.

possible to use Illumina's historical sales data to calculate changes in prices as a result of the alleged infringement while controlling for the changes in the marketplace that would occur absent the alleged infringement. Again, once identified—as Mr. Van Oene has noted will be possible[107]—these data can be used alongside standard economic tools to reliably determine the effect of the defendants' entry on Illumina's sales and profits in order to compensate it for the profits it lost from any potential price erosion due to the defendant's entry, as opposed to other market conditions, at trial.

3. Illumina's Further Assertions Regarding Irreparable Harm Are Unavailing

40. In addition to the assertions that I discussed above, Illumina makes a series of other assertions regarding why it would suffer harm from the alleged infringement and why such harm is hard to quantify. I address those assertions below and explain why they are unavailing.

41. Illumina asserts that any price concessions that it would offer before the trial as a result of the alleged infringement "would likely be irreversible" even if the distribution of the accused DNBSEQ products and sales of the CoolMPS products were enjoined after the trial.[108] This makes no sense as a matter of economics. If the defendants were enjoined from distributing and/or selling their accused DNBSEQ products after the trial, there is little prospect that any price erosions resulting from the alleged infringement would persist after the trial. As a matter of economics, large and sophisticated companies in Illumina's position would adjust their pricing and sales strategies based on the conditions in the marketplace after the removal of defendants' accused DNBSEQ products.[109]

42. While behavioral economics teaches that some customers may—at times—make "irrational" choices based on emotion rather than economic optimization, Illumina offers no

[107] Van Oene Deposition, 199:16-200:18.

[108] Second PI Motion, p. 23. *See also* First PI Motion, pp. 18-19.

[109] Mr. Van Oene testified that Illumina offer year-long pricing contracts for consumables. [Van Oene Deposition, 201:9-21.] I note that, to the extent that Illumina offers any price concession on those year-long contracts because of the alleged infringement, any harm to Illumina as a result of those price concessions can be quantified.

argument or evidence that its customers would fall prey to any of these sorts of biases. To believe Illumina's argument that any price erosion would not be reversible would require the belief that a scientific research institution or biotech company would not be willing to pay a price that it would otherwise have decided was in the best interests of its scientific and/or commercial interests simply because at an earlier point in time the price had gone down temporarily.[110] Therefore, Illumina's assertion that the temporary availability of the defendants' accused DNBSEQ products in the United States allows a customer to negotiate lower prices with Illumina when the defendants are no longer in the marketplace simply defies economic logic.[111]

43. Illumina also asserts that because customers tend to purchase reagents in bulk and at irregular times, it is "more difficult" to quantify the harm to Illumina from lost sales resulting from the alleged infringement.[112] As a threshold matter, because sales of CoolMPS products would occur before the trial, and, as noted above, information regarding those sales will be readily available in this case, there is no economic reason to believe that any sales that Illumina lost before the trial, regardless of whether it was purchased in bulk or at irregular times, cannot be quantified. To the extent that Illumina is suggesting that because customers tend to purchase reagents in bulk, those who bought the defendants' DNBSEQ platforms before the trial would be able to use those platforms after the trial, thereby causing Illumina to lose sales that it would otherwise obtain after the trial, any such harm—to the extent that there would be any—can also be quantified. Again, because information regarding the sales to those customers will be readily available in this case, and because the defendants' "commercialization plan" aims to target a small number of customers in 2020 and 2021, it would not be difficult to identify the customers who purchased the defendants' reagents in bulk and therefore could continue to use the defendants' NGS platforms after the trial.[113]

---

[110] By Illumina's own admission, its customers (and the KOLs that the defendants are allegedly targeting) are complex and sophisticated research intuitions and biotechnology companies. [First Van Oene Declaration, ¶¶27, 48; Second Van Oene Declaration, ¶¶30, 54.]

[111] The assertion that Illumina would not be able to adjust its price is also apparently at odds with Illumina's own practice of offering short-term promotions. [Van Oene Declaration, p. 80:14-16.]

[112] First Van Oene Declaration, ¶68; Second Van Oene Declaration, ¶76.

[113] Illumina also asserts that a customer may be reluctant to "change their protocol mid-project and move back to an Illumina platform," resulting in harm that could not be quantified. [First Van Oene Declaration, ¶61; Second

44. Illumina asserts that the placement of the defendants' accused DNBSEQ products with KOLs is "important from a commercial standpoint because [KOLs] are often large customers that purchase sequencers, consumables, and services."[114] However, Illumina fails to establish that such placement would result in irreparable harm to Illumina. As a threshold matter, providing products to KOLs is a strategy that new entrants to a marketplace of sequencing technologies can adopt, because it allows KOLs to test those alternative sequencing products and compare them with the existing ones.[115] There is no reason to presume that the KOLs in the United States to which the defendants may provide as free trials its accused DNBSEQ products would necessarily be lost sales to Illumina—*i.e.*, Illumina could very well not have been able to make additional sales to those KOLs absent the alleged infringement. Even if one assumes that those KOLs would switch to the defendants' accused DNBSEQ products from Illumina's products in the next two years, thereby resulting in lost sales on Illumina's part before trial, any lost profit from those lost sales can be quantified because of the small number of KOLs that may receive the defendants' accused DNBSEQ products as free trial.

Van Oene Declaration, ¶69.] For the same reasons stated here—that information regarding those sales would be readily available and that the defendants aim to target a small number of customers in 2020 and 2021, it would be possible to quantify any such lost sales that Illumina may suffer.

[114] First Van Oene Declaration, ¶28; Second Van Oene Declaration, ¶31.

[115] In its complaint challenging Illumina's acquisition of Pacific Biosciences, the FTC noted:

> Entry into the U.S. NGS Market is time consuming and extremely difficult. A new entrant into the NGS Market would need to overcome significant scientific, legal, and commercial barriers.
>
> …
>
> Gaining acceptance in the marketplace after launching a product takes significant time and effort. A new system must prove itself reliable and robust before it can expect significant sales to customers in the research and clinical communities. New entrants typically must convince key opinion leaders to use their technology and publish papers to support the use of their products by other researchers, which takes a significant amount of time and creates uncertainty about whether new products, even after they are launched, would be able to compete effectively with existing, proven products.

[Exhibit D17, ¶55.] I note that, again, the uncertainty regarding whether a new entrant in the United States can "compete effectively with existing, proven products," as of now, does not mean that any potential harm to Illumina resulting from such entry will be irreparable. The question is whether or not any such harm will be identifiable at the time of trial, and, as I have discussed above, the harm can be quantified at the time of trial.

See also First Van Oene Declaration, ¶27; Second Van Oene Declaration, ¶30.

45. Illumina also asserts that allowing the defendants to provide as free trials its accused DNBSEQ products to a handful of KOLs in the United States "[would] likely cause other companies and institutions around the world to choose [the defendants'] products over Illumina's products."[116, 117] Even if one assumes that the use by KOLs in the United States of the defendants' technologies would result in increased sales of the defendants' alleged infringing products in the United States before the trial and that those sales were in fact sales that Illumina would make absent the alleged infringement, any such harm to Illumina can be quantified at trial (as I discussed above). Likewise, even if one assumes that the placement of the defendants' accused DNBSEQ products would cause Illumina to offer further price concessions, any such harm to Illumina can also be quantified at trial.

46. With respect to any sales outside the United States that Illumina might lose as a result of the defendants' providing free trials of its accused DNBSEQ products to a handful of KOLs in the United States, I understand that, as a legal matter, even if such a tenuous link could be established, any such losses would not be the result of any alleged infringement of the Asserted Patents in the United States. Moreover, Illumina presented no evidence demonstrating that this supposed harm is likely, and the assertion itself makes little economic sense. Illumina offers no clear explanation as to why customers outside of the United States would be waiting to see what KOLs in the United States do with defendants' products when those products are already available to try locally, or when other local colleagues and KOLs may already be using them. Indeed, the idea that KOLs in the United States are a compelling driver of foreign choices of NGS products is belied by the fact that the defendants were able to obtain a 35 percent share

[116] Second Van Oene Declaration, ¶57.

[117] This assertion is apparently at odds with Mr. Van Oene's testimony that the defendants "have proven their technology and don't need to continue to try to prove that technology to enter any market." [Van Oene Deposition, 220:24-221:12.]

in the marketplace in China without any KOLs in the United States having been provided the accused DNBSEQ products.[118, 119]

VI. There Is No Economic Reason to Believe that the Balance of Hardship Favors a Preliminary Injunction

47. The plaintiffs argue that the balance of hardship also favors a preliminary injunction because the defendants "cannot identify any cognizable hardship that would weigh against preserving the status quo by preliminary [sic] enjoining further infringement."[120]

48. As a threshold matter, were the defendants' accused DNBSEQ products found to be not infringing the Asserted patents, or were the Asserted Patents found to be invalid at trial, a preliminary injunction would result in the defendants losing sales and profits that it would otherwise make from distributing and/or selling their accused DNBSEQ products in the United States before trial. In that case, those lost profits would be harm to the defendants from being enjoined to proceed with its launch plans in the United States. It is also important to note that with a preliminary injunction, the defendants would not be able to approach any customers or make any sales in the United States, making it more difficult to assess the harm to the defendants from a preliminary injunction than to assess the harm to Illumina absent a preliminary injunction. Moreover, as noted above, by the plaintiffs' admission, the customers in the marketplace are brand loyal and reluctant to switch to a new product. Were the defendants' accused DNBSEQ products found to be not infringing the Asserted Patents, or were the Asserted Patents found to be invalid at trial, a delay in the entry of the defendants' products resulting from a preliminary injunction would further enhance Illumina's first-mover advantage; between now and the trial, Illumina could acquire customers who could otherwise purchase the defendants' products.

---

[118] First Van Oene Declaration, ¶54; Second Van Oene Declaration, ¶61. Indeed, if KOLs believe that the defendants have better NGS products than Illumina, keeping those products away from the United States can be against the public interest.

[119] Illumina also asserts that even if, by giving away their accused DNBSEQ sequencers to a handful of KOLs in the United States, the defendants are "simply trying to get a head start on its marketing efforts before the patents expire in a few years," that would still result in irreparable harm to Illumina. For the same reasons stated above, this is entirely speculative. The plaintiffs provided no economic evidence that suggests that the use by a handful of KOLs in the United States of the defendants' technologies over three years before patent expiration would result in increased adoption of defendants' alleged infringing products over Illumina's after patent expiration. [First Van Oene Declaration, ¶52; Second Van Oene Declaration, ¶59.]

[120] Second PI Motion, pp. 24-25. *See also* First PI Motion, p. 21.

Difficulties in convincing a customer to switch would put the defendants at a disadvantage, resulting in additional lost profits on the defendants' part.

49. As I have discussed above, any harm to Illumina resulting from the defendants' distribution and/or sale of their accused DNBSEQ products between now and trial can be quantified at trial and Illumina would be made whole were the defendants' accused DNBSEQ products found to be infringing one or more of the valid Asserted Patents at the trial. Therefore, as a matter of economics, there is no reason to believe that the balance of hardship favors a preliminary injunction.

VII. As a Matter of Economics, a Preliminary Injunction Is Not in the Public Interest

50. The plaintiffs contend that the public interest "is best served by a preliminary injunction" because of the lack of "an important public need or any other 'relevant concern' that outweighs the need to uphold and enforce Illumina's patent rights," and that Illumina "can meet the increased demand with its own sequencers and reagents."[121]

51. Whether or not the granting of an injunction is in the public interest depends on weighing the costs and benefits of allowing the defendants to distribute and/or sell their accused DNBSEQ products in the United States. The societal cost of allowing the defendants to do so is straightforward—as discussed, Illumina could suffer some economic harm from the defendants' entry and, if not compensated for that harm, would earn a diminished return on the investments that it has made into the inventions allegedly covered by the Asserted Patents. However, as I have explained above, any such harm to Illumina would be compensable with monetary damages, and any damages awarded to Illumina would, therefore, maintain the return on its innovations. As such, allowing the defendants to enter would not cause any harm to the incentives to innovate in the United States, as the financial return to Illumina's investments would be maintained.

52. As to the societal benefit of allowing the defendants to market and sell their accused DNBSEQ products, it is widely recognized in economics that increased competition

[121] Second PI Motion, p. 25. *See also* First PI Motion, p. 21.

enhances not only the economic welfare of consumers, but also the total economic welfare of society. In this case, because Illumina is the only supplier of high-throughput NGS platforms in the United States and is a dominant player in the marketplace for DNA sequencing in general, the entry of the defendants' NGS platforms would provide customers with an alternative and increase competition in the marketplace for high-throughput NGS platforms in the United States, thereby benefitting consumers.[122] The United States Department of Justice echoes this principle in its crash course on antitrust laws, which are designed precisely to maintain and encourage higher levels of competition. As Illumina clearly has itself laid out, entry by the defendants is expected to result in increased choice and a reduction in prices to institutions that I understand are engaged in important and potentially ground-breaking medical and scientific research. Moreover, as noted above, according to documents that Illumina prepared in the ordinary course of its business, its NGS products and the defendants' accused DNBSEQ products differ in several aspects, and in some of those aspects, [redacted] That is, entry by the defendants can better satisfy the needs of certain customers that are not met by Illumina's products, further redounding to the benefit of customers.

53. If customers are denied the benefit of the defendants' entry, there is no way to restore that benefit to customers post-trial if the defendants prevail. Not only may customers suffer unnecessarily high prices and reduced choice until trial, but also any scientific breakthroughs that may have occurred as a result of the increased choice and lowered prices would possibly be gone forever. To the contrary, any harm from the alleged patent infringement will be calculable, and, if the defendants are to be found liable for patent infringement, the

[122] Mr. Van Oene states that MGI's NGS platforms and reagents provides a cheaper alternative to Illumina's NGS platforms and reagents for whole genome sequencing. Specifically, according to Mr. Van Oene, "for the highest-production sequencers," MGI's DNBSEQ-T7 offers a 50 to 75 percent discount per Gb of data compared to Illumina's NovaSeq. He also states that "the typical cost of reagents for sequencing a human genome using Illumina's NovaSeq 6000 platform is approximately $800," and that "MGI advertises its equivalent DNBSEQ-T7 instrument as costing approximately $500 in consumables per human genome." [See First Van Oene Declaration, ¶36; Second Van Oene Declaration, ¶40.]

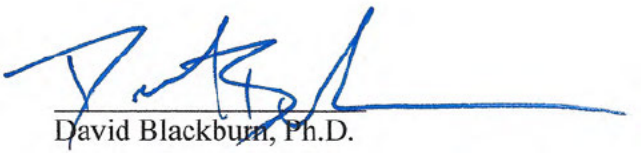
According to Front Line Genomics, MGI offers a "price-point for [whole genome sequencing] that is really hard to beat of $600," which is "an all-in cost of library preparation, sequencing, and post-sequencing analysis." [Second Van Oene Declaration, Exhibit JJ, p. 14.] [*See also* Exhibit D47.]

[123] Exhibit D48 at ILMNBGI1085304.

plaintiffs will be made whole through a damages award and thus the incentives to innovate and the integrity of the patent system would be maintained.[124]

54. Thus, as a matter of economics, in my opinion, the granting of a preliminary injunction would not serve the public interest. Rather, the public interest would, as an economic matter, be best served by allowing the defendants to enter in the United States, with the awarding of the appropriate level of damages compensation, if any, to the plaintiffs, should the defendants be found liable for infringing the Asserted Patents at trial.

I declare under penalty of perjury that the foregoing is true and correct.



David Blackburn, Ph.D.

April 10, 2020

[124] Illumina claims that the defendants are able to offer "artificially lower prices" in part because they did not "have to make the substantial research and development expenditures that Illumina incurred" to develop the patented technology. [First Van Oene Declaration, ¶23; Second Van Oene Declaration, ¶26.] Setting aside whether the defendants indeed infringed the patented technology, Illumina's assertion makes no economic sense. Any cost that Illumina incurred for the development of the patented technology is a sunk cost—*i.e.*, a cost that Illumina incurred before its pricing decisions. Economics teaches that a rational, profit maximizing firm in Illumina's position does not price its products based on sunk costs. Therefore, it makes no economic sense that the defendants are able to offer "artificially lower prices" than Illumina because Illumina incurred higher sunk cost associated with the development of the patented technology. Rather, the expectation that the defendants' price may be lower than Illumina's current price may merely reflect the level of competition that each expects/faces in the marketplace. That is, the defendants' price reflects the price level in a marketplace in which they expect to compete with Illumina, but Illumina's current price reflects the market condition that it currently faces—*i.e.*, a limited level of competition in the United States. The fact that Mr. Van Oene states that Illumina expects to lower its price if it faces competition from the defendants makes clear that Illumina can charge a lower price as well but chooses not to.

NERA
Economic Consulting

National Economic Research Associates, Inc.
Suite 600
1255 23rd Street, NW
Washington, DC 20037
+1 202 466 3510 Fax +1 202 466 3605
Direct Dial: +1 202 466 9264
david.blackburn@nera.com
www.nera.com

Attachment 1

David Blackburn
Director and Head of Life Sciences Practice

Education

Harvard University
Ph.D., Economics, 2005

Brown University
B.Sc., with Honors, Applied Mathematics and Economics, 1998

Professional Experience

NERA Economic Consulting

2017-	Director (Head of Life Sciences Group, 2019-)
2012-2016	Vice President/Associate Director
2008-2012	Senior Consultant
2005-2008	Consultant

Framingham State College

2003	Instructor - Intermediate Microeconomics

Universidad Nacional de Tucumán, Argentina

Summer 2002	Visiting Professor
	Instructor - Regulation in Network Industries

Written Testimony

Rebuttal Expert Report of David Blackburn, Ph.D., *Intellectual Ventures I, LLC and Intellectual Ventures II, LLC v. Lenovo Group Ltd., Lenovo (United States) Inc., LenovoEMC Products USA, LLC and EMC Corp.,* United States District Court for the District of Massachusetts, Case No. 1:16-cv-10860-PBS, February 2020. Assess damages related to alleged patent infringement relating to data encryption.

Rebuttal Report of David Blackburn, Ph.D., *Covves LLC v. Dillards, Inc., Kohl's Corporation, Saks & Company LLC, Target Brands, Inc., Express Inc., Tilly's Inc., Nordstrom, Inc., West Marine, Inc., and Zulily, Inc.*, United States District Court, Central District of California, Case No. 2:18-cv-08518-RGK-AFM, November 2019. Assess damages related to alleged unjust enrichment of defendants related to design patent infringement.

Expert Report of David Blackburn, Ph.D., *Fulfillium, Inc. v ReShape Medical, LLC and ReShape Lifesciences, Inc.,* United States District Court, Central District of California, Western Division, Case No. 8:18-cv-01265-RGK-PLA, July 2019. Assess damages for ReShape's alleged patent infringement relating to intragastric balloons.

Expert Report of David Blackburn, Ph.D., *Errant Gene Therapeutics, LLC v. Sloan Kettering Institute for Cancer Research and BlueBird Bio, Inc.*, Supreme Court of the State of New York, County of New York, Index No. 150856/2017, April 2019. Assess EGT's claim for damages resulting from claims of fraud and breach of contract relating to gene therapy.

Reply Expert Report of David Blackburn, Ph.D., *Actelion Pharmaceuticals, Ltd. v. Sun Pharmaceutical Industries, Inc. and Sun Pharmaceutical Industries Limited*, United States District Court for the District of New Jersey, Case No. 3:17-cv-5015 (PGS)(DEA), February 2019. Assess commercial success and nexus for Veletri (epoprostenol).

Rebuttal Report of David Blackburn, Ph.D., *Zi Beauty, Inc. v. General Growth Properties, Inc. et al.*, District Court, Clark County, Nevada, Case No: A-16-744558-B, Dept. No. XIII, December 2018. Assess plaintiff claims of anticompetitive tie of leases at malls in Las Vegas area, as well as damages.

Declaration of David Blackburn, Ph.D., *Genentech, Inc., Biogen Inc., Hoffmann-La Roche, Inc., and City of Hope v. Celltrion, Inc., Celltrion HealthCare Co., Ltd., Teva Pharmaceuticals USA, Inc., and Teva Pharmaceuticals GmbH,* United States District Court for the District of New Jersey, Case No. 1:18-CV-0f0574, September 2018. Assess issue of irreparable harm and public interest from Teva and Celltrion's proposed rituximab biosimilar.

Declaration of David Blackburn, Ph.D., *Genentech, Inc., Biogen Inc., Hoffmann-La Roche, Inc., and City of Hope v. Celltrion, Inc., Celltrion HealthCare Co., Ltd., Teva Pharmaceuticals USA, Inc., and Teva Pharmaceuticals GmbH,* United States District Court for the District of New Jersey, Case No. 1:18-CV-0f0574, September 2018. Assess issue of irreparable harm and public interest from Teva and Celltrion's proposed rituximab biosimilar.

Updated: March 11, 2020

Opposition Expert Report of David Blackburn, Ph.D., *Meridian Bioscience, Inc. v. DiaSorin, Inc.,* U.S. District Court for the Southern District of Ohio, Western Division (Cincinnati), Case No. 1:17-cv-341, July 2018. Assess issue of irreparable harm and public interest from Meridian's request to prevent the entry of diagnostic tests to be sold by DiaSorin.

Rebuttal Expert Report of David Blackburn, Ph.D., *Cascades Streaming Technologies, LLC v. Big Ten Network, LLC,* U.S. District Court for the Northern District of Illinois, Eastern Division, Case No. 13-cv-01455, December 2017. Assess reasonable royalty damages relating to Big Ten Network's alleged infringement of a Cascades patent relating to video streaming.

Rebuttal Expert Report of David Blackburn, Ph.D., *Twentieth Century Fox Film Corp., and Twentieth Century Fox Home Entertainment LLC v. Hitachi, Ltd. et al*, International Center for Dispute Resolution, November 2017. Assess whether or not the aggregate royalty rate for SEPs for Blu-ray technology is FRAND.

Rebuttal Expert Report of David Blackburn, Ph.D., *Boehringer Ingelheim Pharmaceuticals Inc., Boehringer Ingelheim International GmbH, Boehringer Ingelheim Corporation, and Boehringer Ingelheim Pharma GmbH & Co. KG v. HEC Pharm Co., Ltd. et al.*, U.S. District Court, District of New Jersey, Case No. Civil Action No. 3:15-cv-05982-PGS-TJB, November 2017. Assess the commercial success of patents relating to Tradjenta and Jentadueto, pharmaceutical products sold by Boehringer.

Rebuttal Testimony of Linda McLaughlin and David Blackburn, On Behalf of the Public Broadcasting Service, *In re: Distribution of Cable Royalty Funds, Consolidated Proceeding No. 14-CRB-0010-CD (2010-13)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., September 2017. Assess survey results related to the relative value of public television to cable systems operators.

Rebuttal Expert Report of David Blackburn, Ph.D., *The Chamberlain Group, Inc. v. Techtronic Industries Co. Ltd., et al.*, U.S. District Court, Northern District of Illinois, Eastern Division, Civil Action No. 1:16-cv-06097, June 2017. Assess liability and damages related to TTI's Walker Process antitrust counterclaims related to Chamberlain's patent covering certain functionality of a garage door opener.

Second Rebuttal Expert Report of David Blackburn, Ph.D., *California Berry Cultivars, LLC v. The Regents of the University of California* and *The Regents of the University of California v. California Berry Cultivars, LLC, Douglas Shaw, and Kirk Larson*, U.S. District Court, Northern District of California, Case No. 3:16-cv-02477-VC, March 2017. Assess UC's claim for damages resulting from allegations of patent infringement and other claims under various injunction and partial injunction scenarios.

Updated: March 11, 2020

Amended Written Testimony of Linda McLaughlin and David Blackburn, On Behalf of the Public Broadcasting Service, *In re: Distribution of Cable Royalty Funds, Consolidated Proceeding No. 14-CRB-0010-CD (2010-13)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., March 2017. Assess the share of cable royalty funds to be distributed to Public Television.

Rebuttal Expert Report of David Blackburn, P.D., *Marjam Supply Company v. Firestone Building Products Company, LLC; Firestone Diversified Products, LLC; and Genflex Roofing Systems, LLC*, U.S. District Court, District of New Jersey, Case No. 11-cv-07119(WJM)(MF), February 2017. Assess Marjam's Robinson-Patman claims against Firestone and associated damages.

Rebuttal Expert Report of David Blackburn, Ph.D., *California Berry Cultivars, LLC v. The Regents of the University of California* and *The Regents of the University of California v. California Berry Cultivars, LLC, Douglas Shaw, and Kirk Larson*, U.S. District Court, Northern District of California, Case No. 3:16-cv-02477-VC, February 2017. Assess UC's claim for damages resulting from allegations of patent infringement and other claims.

Written Rebuttal Testimony of David Blackburn, Ph.D., On Behalf of SoundExchange, *16-CRB-0001-SR/PSSR (2018-2022) Determination of Royalty Rates and Terms for Transmission of Sound Recordings by Satellite Radio and "Preexisting" Subscription Services (SDARS III)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., February 2017. Assess the proper methodology for evaluation of candidate benchmark license agreements related to interactive streaming services.

Written Testimony of Linda McLaughlin and David Blackburn, On Behalf of the Public Broadcasting Service, *In re: Distribution of Cable Royalty Funds, Consolidated Proceeding No. 14-CRB-0010-CD (2010-13)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., December 2016. Assess the share of cable royalty funds to be distributed to Public Television.

Affidavit of David Blackburn, *Simon Property Group, L.P., on behalf of itself and its affiliated landlord entities v. Kenneth Cole Consumer Direct, LLC and Kenneth Cole Productions, Inc.,* In the Marion Superior Court (Indiana), Cause No. 49D01-1612-PL-043144, December 2016. Assess issues related to the calculability of damages resulting from Kenneth Cole's closure of retail stores at Simon owned shopping centers.

Expert Report of David Blackburn, P.D., *Marjam Supply Company v. Firestone Building Products Company, LLC; Firestone Diversified Products, LLC; and Genflex Roofing Systems, LLC*, U.S. District Court, District of New Jersey, Case No. 11-cv-07119(WJM)(MF), November 2016. Assess Marjam's Robinson-Patman claims against Firestone and associated damages.

Declaration of David Blackburn, *Merck & Cie, et al., Applicants, v. Watson Laboratories, Inc., Respondent*, In the Supreme Court of the United States, July 2016. Assess issues related to irreparable harm and the public interest from Applicants request to stay the entry of a generic pharmaceutical product.

Rebuttal Expert Report of David Blackburn, Ph.D., *PPC Broadband, Inc., d/b/a PPC v. Corning Optical Communications RF, LLC*, U.S. District Court, Northern District of New York, Case No. 5:13-cv-00538-GLS-DEP, March 2016. Assess PPC's damages from Corning's alleged patent infringement.

Expert Report of David Blackburn, Ph.D., *PPC Broadband, Inc., d/b/a PPC v. Corning Optical Communications RF, LLC*, U.S. District Court, Northern District of New York, Case No. 5:13-cv-00538-GLS-DEP, November 2015. Assess PPC's damages from Corning's alleged patent infringement.

Expert Report of David Blackburn, Ph.D., *Cubist Pharmaceuticals LLC v. Agila Specialties Inc. and Mylan Laboratories Limited*, U.S. District Court, District of Delaware, Case No.: C.A. No. 13-1679 (GMS), October 2015. Assess the commercial success of Cubicin, a pharmaceutical product sold by Cubist.

Rebuttal Declaration of David Blackburn, Ph.D., *Torrent Pharmaceuticals Limited and Apotex, Inc. and Mylan Pharmaceuticals, Inc., Petitioners v. Novartis AG and Mitsubishi Pharma Corp., Patent Owners,* Before the Patent Trial and Appeal Board, Case IPR2014-00784, Case IPR2015-00518, Patent 8,324,283 B2, June 2015. Assess the commercial success of Gilenya, a pharmaceutical product sold by Novartis.

Supplemental Rebuttal Expert Report of David Blackburn, *International Business Machines Corporation v. BGC Partners, Inc., BGC Brokers US, L.P., BGC Financial L.P., and BGC USA, L.P.*, U.S. District Court, Southern District of New York, Civil Action No. 1:10-cv-00128, May 2015. Assess IBM's supplemental claim for damages resulting from BGC's alleged breach of contract and copyright infringement.

Expert Report of David Blackburn, Ph.D., *Supernus Pharmaceuticals, Inc. v. Actavis Inc., and Actavis Laboratories FL, Inc., Actavis Pharma, Inc., Watson Laboratories, Inc., and ANDA, Inc.*, United States District Court, District of New Jersey, Civil Action No. 13-4740 (RMB) (JS) and Civil Action No. 14-1981 (RMS)(JS), May 2015. Assess the commercial success of Oxtellar XR, a pharmaceutical product sold by Supernus.

Updated: March 11, 2020

Declaration of David Blackburn, Ph.D. in Support of SoundExchange's Motion in Limine to Exclude the Written Rebuttal Testimony of Todd Kendall, *14-CRB-0001-WR (2016-2020) Determination of Royalty Rates for Digital Performance in Sound Recordings and Ephemeral Recordings (Web IV)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., April 2015.

Declaration of David Blackburn, Ph.D., *Torrent Pharmaceuticals Limited and Apotex, Inc. and Mylan Pharmaceuticals, Inc., Petitioners v. Novartis AG and Mitsubishi Pharma Corp., Patent Owners,* Before the Patent Trial and Appeal Board, Case IPR2014-00784, Case IPR2015-00518, Patent 8,324,283 B2, April 2015. Assess the commercial success of Gilenya, a pharmaceutical product sold by Novartis.

Declaration of David Blackburn, Ph.D., *Otsuka Pharmaceutical Co., Ltd. v. Actavis Elizabeth LLC, Jubilant Life Sciences Limited, Jubilant Generics Limited and Jubilant Life Sciences (USA) Inc.*, United States District Court, District of New Jersey, Civil Action No. 14-cv-07106-JBS-KMW, March 2015. Assess potential impact of at-risk entry by Actavis and others of a generic formulation of aripiprazole.

Written Rebuttal Testimony of David Blackburn, Ph.D., On Behalf of SoundExchange, Inc., *14-CRB-0001-WR (2016-2020) Determination of Royalty Rates for Digital Performance in Sound Recordings and Ephemeral Recordings (Web IV)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., February 2015. Assess webcasting and relationship to other music distribution channels.

Expert Report of David Blackburn, Ph.D., *Endo Pharmaceuticals Inc. and Grünenthal GmbH v. Actavis Inc., Actavis South Atlantic LLC, and Watson Pharmaceuticals, Inc.*, United States District Court for the Southern District of New York, C.A. No. 13-cv-436-TPG, January 2015. Assess the commercial success of Opana ER, a long-acting opioid sold by Endo.

Expert Report of David Blackburn, Ph.D., *Takeda Pharmaceuticals Co., Ltd., Takeda Pharmaceuticals U.S.A., Inc., and Takeda Pharmaceuticals America, Inc. v. TWI Pharmaceuticals, Inc.*, United States District Court for the Northern District of California, Case No. 5:13-cv-02420 LHK (PSG), December 2014. Assess the commercial success of Takeda's Dexilant pharmaceutical product.

Report of David Blackburn, Ph.D., On Behalf of SoundExchange, *14-CRB-0001-WR (2016-2020) Determination of Royalty Rates for Digital Performance in Sound Recordings and Ephemeral Recordings (Web IV)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., October 2014. Assess webcasting and relationship to other music distribution channels.

Updated: March 11, 2020

Expert Report of David Blackburn, Ph.D., *Carrier Corporation v. Goodman Global, Inc., Goodman Manufacturing Company, L.P., Goodman Global Holdings, Inc., Goodman Distribution, Inc., and Goodman Sales Company,* United States District Court, District of Delaware, C.A. No. 12-930 (SLR), February 2014. Assess commercial success of Carrier's Infinity HVAC system and related patents.

Declaration of David Blackburn, Ph.D., *Ferring B.V. v. Watson Laboratories, Inc. - Florida*, United States District Court, District of Nevada, Case Nos.: 3:11-cv-00481-RCJ-VPC, 2:12-cv-01935-RCJ-VPC, and 3:11-cv-00853-RCJ-VPC, February 2014. Asses potential impact of continued sale of Watson's generic tranexamic acid tables.

Expert Report of David Blackburn, Ph.D. and Supplemental Expert Report of David Blackburn, Ph.D., *In re: Cengage Learning, Inc. et al.*, U.S. Bankruptcy Court, Easter District of New York, Case No.: 13-44106 (ESS), Case No.: 13-44105 (ESS), Case No.: 13-44107 (ESS), and Case No.: 13-44108 (ESS), December 2013 and January 2014. Assess the appropriate royalty rates to use in determining the value of certain copyrights held by Cengage.

Expert Report of David Blackburn, Ph.D., *Energy Intelligence Group, Inc. and Energy Intelligence Group (UK) Limited v. Canal Barge Company, Inc.*, United States District Court, Eastern District of Louisiana, Civil Action No.: 12-cv-02107-JCZ-DEK, June 2013. Supplemental Expert Report of David Blackburn, Ph.D., December 2013. Assess EIG's claim for damages resulting from Canal Barge's alleged copyright infringement.

Expert Report of David Blackburn, Ph.D., *Machine Maintenance Inc., d/b/a Lucy Equipment Services, Inc. v. Generac Power Systems, Inc.*, United States District Court, Eastern District of Missouri, Eastern Division, Case No: 4:12-cv-793-JCH, September 2013. Assess the reasonableness of Generac's determination of the market opportunities available to Luby.

Declaration of David Blackburn, Ph.D., *Endo Pharmaceuticals, Inc. v. Actavis, Inc. and Actavis South Atlantic LLC*, United States District Court, Southern District of New York, Civil Action No. 12-cv-8985-TPG-GWG, August 2013. Assess potential impact of at-risk entry by Actavis and Roxane of a generic extended-release oxymorphone.

Rebuttal Expert Report of David Blackburn, Ph.D., *Ferring B.V. v. Watson Laboratories, Inc. - Florida*, United States District Court, District of Nevada, Case Nos.: 3:11-cv-00481-RCJ-VPC, 2:12-cv-01935-RCJ-VPC, and 3:11-cv-00853-RCJ-VPC, June 2013. Assess commercial success of Lysteda and related patents.

Expert Report of David Blackburn, Ph.D., *Warner Chilcott Company, LLC v. Watson Laboratories, Inc.* and *Warner Chilcott Company, LLC v. Lupin Ltd. and Lupin Pharmaceuticals, Inc.*, United States District Court, District of New Jersey, 12-cv-2928-JAP-TJB, June 2013. Assess commercial success of Lo Loestrin Fe and related patents.

Expert Report of David Blackburn, Ph.D. and Declaration of David Blackburn, *Edward L. White, P.C., v. West Publishing Corporation d/b/a "West"; and Reed Elsevier Inc., d/b/a LexisNexis*, United States District Court, Southern District of New York, Case No. 12-cv-1340, September 2012 and October 2012. Assess economic factors related to fair use considerations in Lexis's and West's alleged copyright infringement.

Expert Report of David Blackburn, Ph.D., *William F. Shea, LLC, et al. v. Bonutti Research, Inc., et al.*, United States District Court, Southern District of Ohio, Case No. 2:10-cv-615, January 2012. Assess issues relating to alleged competition related to Shea's alleged breach of contract and other claims.

Rule 26(b)(4) Expert Witness Disclosure of Plaintiffs Wildheart Entertainment, L.P., Maxim Langstaff, and Michele Langstaff, *Wildheart Entertainment, L.P., Maxim Langstaff, and Michele Langstaff v. Higher Ground, LLC et al.*, Superior Court for the District of Columbia (Civil Division), Civil Action No. 2010 CA 005253 B, June 2011. Assess Wildheart's claims for damages resulting from Higher Ground's alleged breach of contract, interference, and other claims.

Expert Report of David Blackburn and Christine S. Meyer, *Waddington North America, Inc. v. Sabert Corporation*, United States District Court for the District of New Jersey, Civil Action No. 2:09-cv-04883-GEB-MCA, January 2011. Assess Waddington's claim for damages resulting from Sabert's alleged infringement of patented metalized cutlery technology.

Rebuttal Expert Report of David Blackburn, *International Business Machines Corporation v. BGC Partners, Inc., BGC Brokers US, L.P., BGC Financial L.P., and BGC USA, L.P.*, U.S. District Court, Southern District of New York, Civil Action No. 1:10-cv-00128, November 2010. Assess IBM's claim for damages resulting from BGC's alleged breach of contract and copyright infringement.

Expert Report of David Blackburn, *Danforth S. DeSena, DPM and Solstice Corporation v. Beekley Corporation*, United States District Court, District of Maine, Civil Action No. 2:09-cv-00352-DBH, December 2009. Assess DeSena's claim for damages from Beekley's alleged infringement of patented radiographic scanner technology.

Report of David Blackburn on Claimed Monopolistic Impact of Proposed New York State Legislation (Senate Bill Number 3708-D), Letter to Governor David Paterson, December 2009.

Updated: March 11, 2020

Expert Report of David Blackburn, Ph.D., *Carolina Power & Light Co., et al. v. Aspect Software, Inc. and BellSouth Communications Systems, L.L.C.*, United States District Court, Eastern District of North Carolina, Western Division, Case No. 5:08-cv-00449, October 2009. Assess Aspect's indemnification obligation relating to a patent settlement entered into by Carolina Power.

Expert Report of David Blackburn, *Jose Estrada and Rene Byron Brizuela v. Toyota Motor Sales USA, Inc., et al.*, United States District Court, Central District of California, Case No. CV 08-05992 GAF(AJWx), October 2009. Assess Estrada's claim for damages resulting from the alleged infringement of Estrada's musical copyrights.

Expert Report of David Blackburn, *UMG Recordings, Inc., et al. v. Divx, Inc., et al.*, United States District Court, Central District of California, Case No. CV 07 06835 – AHM(AJWx), August 2009. Rebuttal Expert Report of David Blackburn, September 2009. Assess the extent and source of UMG's damages resulting from Divx's alleged infringement of UMG's copyrighted works.

Expert Report of David Blackburn, Ph.D., *Dominion Resources, Inc. v. Aspect Software, Inc. and Rockwell Automation, Inc.*, United States District Court, Eastern District of Virginia, Case No. 3-08-cv-737, June 2009. Assess Aspect's indemnification obligation relating to a patent settlement entered into by Dominion.

Expert Report of David Blackburn, Ph.D., *UMG Recordings, Inc., et al. v. Veoh Networks, Inc., et al.*, United States District Court, Central District of California, Case No. CV 07 5744 – AHM(AJWx), May 2009. Rebuttal Expert Report of David Blackburn, Ph.D., June 2009. Assess the extent and source of UMG's damages resulting from Veoh's alleged infringement of UMG's copyrighted works.

Report of David Blackburn on Claimed Monopolistic Impact of Proposed New York State Legislation (Senate Bill Number 4487-B), Letter to Governor David Patterson, November 2008.

Expert Report of Steven Schwartz and David Blackburn, *Ford Motor Company v. Sudesh Agrawal*, Cuyahoga County Court of Common Pleas, Case No. CV-04-536688, January 2008. Assess class claim for damages resulting from Ford's allegedly unlawful policies relating to excess wear and use.

Live Testimony

Deposition Testimony, *Fulfillium, Inc. v ReShape Medical, LLC and ReShape Lifesciences, Inc.,* United States District Court, Central District of California, Western Division, Case No. 8:18-cv-01265-RGK-PLA, July 2019. Assess damages for ReShape's alleged patent infringement relating to intragastric balloons.

Deposition Testimony, *Errant Gene Therapeutics, LLC v. Sloan Kettering Institute for Cancer Research and BlueBird Bio, Inc.*, Supreme Court of the State of New York, County of New York, Index No. 150856/2017, May 2019. Assess EGT's claim for damages resulting from claims of fraud and breach of contract relating to gene therapy.

Deposition Testimony, *Genentech, Inc., Biogen Inc., Hoffmann-La Roche, Inc., and City of Hope v. Celltrion, Inc., Celltrion HealthCare Co., Ltd., Teva Pharmaceuticals USA, Inc., and Teva Pharmaceuticals GmbH,* United States District Court for the District of New Jersey, Case No. 1:18-CV-0f0574, September 2018. Assess issue of irreparable harm and public interest from Teva and Celltrion's proposed rituximab biosimilar.

Trial Testimony, *Boehringer Ingelheim Pharmaceuticals Inc., Boehringer Ingelheim International GmbH, Boehringer Ingelheim Corporation, and Boehringer Ingelheim Pharma GmbH & Co. KG v. HEC Pharm Co., Ltd. et al.*, U.S. District Court, District of New Jersey, Case No. Civil Action No. 3:15-cv-05982-PGS-TJB, June 2018. Assess the commercial success of patents relating to Tradjenta and Jentadueto, pharmaceutical products sold by Boehringer.

Deposition Testimony, *Cascades Streaming Technologies, LLC v. Big Ten Network, LLC,* U.S. District Court for the Northern District of Illinois, Eastern Division, Case No. 13-cv-01455, December 2017. Assess reasonable royalty damages relating to Big Ten Network's alleged infringement of a Cascades patent relating to video streaming.

Deposition Testimony, *Boehringer Ingelheim Pharmaceuticals Inc., Boehringer Ingelheim International GmbH, Boehringer Ingelheim Corporation, and Boehringer Ingelheim Pharma GmbH & Co. KG v. HEC Pharm Co., Ltd. et al.*, U.S. District Court, District of New Jersey, Case No. Civil Action No. 3:15-cv-05982-PGS-TJB, December 2017. Assess the commercial success of patents relating to Tradjenta and Jentadueto, pharmaceutical products sold by Boehringer.

Updated: March 11, 2020

Deposition Testimony, *The Chamberlain Group, Inc. v. Techtronic Industries Co. Ltd., et al.*, U.S. District Court, Northern District of Illinois, Eastern Division, Civil Action No. 1:16-cv-06097, July 2017. Assess liability and damages related to TTI's Walker Process antitrust counterclaims related to Chamberlain's patent covering certain functionality of a garage door opener.

Trial Testimony, *California Berry Cultivars, LLC v. The Regents of the University of California* and *The Regents of the University of California v. California Berry Cultivars, LLC, Douglas Shaw, and Kirk Larson*, U.S. District Court, Northern District of California, Case No. 3:16-cv-02477-VC, June 2017. Testimony in equitable relief hearing.

Rebuttal Hearing Testimony, On Behalf of SoundExchange, Inc., *16-CRB-0001-SR/PSSR (2018-2022) Determination of Royalty Rates and Terms for Transmission of Sound Recordings by Satellite Radio and "Preexisting" Subscription Services (SDARS III)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., May 2017. Assess the proper methodology for evaluation of candidate benchmark license agreements related to interactive streaming services.

Deposition Testimony, *Marjam Supply Company v. Firestone Building Products Company, LLC; Firestone Diversified Products, LLC; and Genflex Roofing Systems, LLC*, U.S. District Court, District of New Jersey, Case No. 11-cv-07119(WJM)(MF), April 2017. Assess Marjam's Robinson-Patman claims against Firestone and associated damages.

Deposition Testimony, *California Berry Cultivars, LLC v. The Regents of the University of California* and *The Regents of the University of California v. California Berry Cultivars, LLC, Douglas Shaw, and Kirk Larson*, U.S. District Court, Northern District of California, Case No. 3:16-cv-02477-VC, March 2017. Assess UC's claim for damages resulting from allegations of patent infringement and other claims.

Deposition Testimony, *16-CRB-0001-SR/PSSR (2018-2022) Determination of Royalty Rates and Terms for Transmission of Sound Recordings by Satellite Radio and "Preexisting" Subscription Services (SDARS III)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., March 2017. Assess the proper methodology for evaluation of candidate benchmark license agreements related to interactive streaming services.

Trial Testimony, *Supernus Pharmaceuticals, Inc. v. Actavis Inc., and Actavis Laboratories FL, Inc., Actavis Pharma, Inc., Watson Laboratories, Inc., and ANDA, Inc.*, United States District Court, District of New Jersey, Civil Action No. 13-4740 (RMB) (JS) and Civil Action No. 14-1981 (RMS)(JS), December 2015. Assess the commercial success of Oxtellar XR, a pharmaceutical product sold by Supernus.

Updated: March 11, 2020

Deposition Testimony (Rebuttal), *Torrent Pharmaceuticals Limited and Apotex, Inc. and Mylan Pharmaceuticals, Inc., Petitioners v. Novartis AG and Mitsubishi Pharma Corp., Patent Owners,* Before the Patent Trial and Appeal Board, Case IPR2014-00784, Case IPR2015-00518, Patent 8,324,283 B2, July 2015. Assess the commercial success of Gilenya, a pharmaceutical product sold by Novartis.

Deposition Testimony, *Supernus Pharmaceuticals, Inc. v. Actavis Inc., and Actavis Laboratories FL, Inc., Actavis Pharma, Inc., Watson Laboratories, Inc., and ANDA, Inc.*, United States District Court, District of New Jersey, Civil Action No. 13-4740 (RMB) (JS) and Civil Action No. 14-1981 (RMS)(JS), July 2015. Assess the commercial success of Oxtellar XR, a pharmaceutical product sold by Supernus.

Deposition Testimony, *Torrent Pharmaceuticals Limited and Apotex, Inc. and Mylan Pharmaceuticals, Inc., Petitioners v. Novartis AG and Mitsubishi Pharma Corp., Patent Owners,* Before the Patent Trial and Appeal Board, Case IPR2014-00784, Case IPR2015-00518, Patent 8,324,283 B2, June 2015. Assess the commercial success of Gilenya, a pharmaceutical product sold by Novartis.

Rebuttal Hearing Testimony, On Behalf of SoundExchange, Inc., *14-CRB-0001-WR (2016-2020) Determination of Royalty Rates for Digital Performance in Sound Recordings and Ephemeral Recordings (Web IV)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., May 2015. Assess webcasting and relationship to other music distribution channels.

Direct Hearing Testimony, On Behalf of SoundExchange, Inc., *14-CRB-0001-WR (2016-2020) Determination of Royalty Rates for Digital Performance in Sound Recordings and Ephemeral Recordings (Web IV)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., May 2015. Assess webcasting and relationship to other music distribution channels.

Deposition Testimony, *14-CRB-0001-WR (2016-2020) Determination of Royalty Rates for Digital Performance in Sound Recordings and Ephemeral Recordings (Web IV)*, Before the United States Copyright Royalty Judges, Library of Congress, Washington, D.C., April 2015. Assess webcasting and relationship to other music distribution channels.

Deposition Testimony, *Endo Pharmaceuticals Inc. and Grünenthal GmbH v. Actavis Inc., Actavis South Atlantic LLC, and Watson Pharmaceuticals, Inc.*, United States District Court for the Southern District of New York, C.A. No. 13-cv-436-TPG, February 2015. Assess the commercial success of Opana ER, a long-acting opioid sold by Endo.

Deposition Testimony, *Carrier Corporation v. Goodman Global, Inc., Goodman Manufacturing Company, L.P., Goodman Global Holdings, Inc., Goodman Distribution, Inc., and Goodman Sales Company,* United States District Court, District of Delaware, C.A. No. 12-930 (SLR), April 2014. Assess commercial success of Carrier's Infinity HVAC system and related patents.

Deposition Testimony, *Energy Intelligence Group, Inc. and Energy Intelligence Group (UK) Limited v. Canal Barge Company, Inc.*, United States District Court, Eastern District of Louisiana, Civil Action No.: 12-cv-02107-JCZ-DEK, December 2013 and July 2013. Assess EIG's claim for damages resulting from Canal Barge's alleged copyright infringement.

Trial Testimony, *Warner Chilcott Company, LLC v. Watson Laboratories, Inc.* and *Warner Chilcott Company, LLC v. Lupin Ltd. and Lupin Pharmaceuticals, Inc.*, United States District Court, District of New Jersey, 12-cv-2928-JAP-TJB and 11-cv-5048-JAP-TJB, October 2013. Assess commercial success of Lo Loestrin Fe and related patents.

Deposition Testimony, *Machine Maintenance Inc., d/b/a Luby Equipment Services, Inc. v. Generac Power Systems, Inc.*, United States District Court, Eastern District of Missouri, Eastern Division, Case No: 4:12-cv-793-JCH, September 2013. Assess the reasonableness of Generac's determination of the market opportunities available to Luby.

Deposition Testimony, *Warner Chilcott Company, LLC v. Watson Laboratories, Inc.* and *Warner Chilcott Company, LLC v. Lupin Ltd. and Lupin Pharmaceuticals, Inc.*, United States District Court, District of New Jersey, 12-cv-2928-JAP-TJB, August 2013. Assess commercial success of Lo Loestrin Fe and related patents.

Deposition Testimony, *Ferring B.V. v. Watson Laboratories, Inc. - Florida*, United States District Court, District of Nevada, Case Nos.: 3:11-cv-00481-RCJ-VPC, 2:12-cv-01935-RCJ-VPC, and 3:11-cv-00853-RCJ-VPC, August 2013. Assess commercial success of Lysteda and related patents.

Deposition Testimony, *International Business Machines Corporation v. BGC Partners, Inc., BGC Brokers US, L.P., BGC Financial L.P., and BGC USA, L.P.*, U.S. District Court, Southern District of New York, Civil Action No. 1:10-cv-00128, December 2010. Assess IBM's claim for damages resulting from BGC's alleged breach of contract and copyright infringement.

Deposition Testimony, *Danforth S. DeSena, DPM and Solstice Corporation v. Beekley Corporation*, United States District Court, District of Maine, Civil Action No. 2:09-cv-00352-DBH, February 2010. Assess DeSena's claim for damages from Beekley's alleged infringement of patented radiographic scanner technology.

Updated: March 11, 2020

Deposition Testimony, *Carolina Power & Light Co., et al. v. Aspect Software, Inc. and BellSouth Communications Systems, L.L.C.*, United States District Court, Eastern District of North Carolina, Western Division, Case No. 5:08-cv-00449, December 2009. Assess Aspect's indemnification obligation relating to a patent settlement entered into by Carolina Power.

Deposition Testimony, *UMG Recordings, Inc., et al. v. Veoh Networks, Inc., et al.,* United States District Court, Central District of California, Case No. CV 07 5744 – AHM(AJWx), July 2009. Assess the extent and source of UMG's damages resulting from Veoh's alleged infringement of UMG's copyrighted works.

Papers and Publications

"Impacts of Digital Video Piracy on the U.S. Economy" (w J. Eisenach and D. Harrison), Global Innovation Policy Center Paper, June 2019.

"The Impact of Online Video Distribution on the Global Market for Digital Content" (w. J. Eisenach and B. Soria), NERA White Paper, March 2019.

"Calculating Damages in Patent Infringement" (w/ A. Cox and C. Meyer), *Corporate Disputes*, July-September 2016.

"25 Percent, 50 Percent ... What's In A Number?" (w/ C. Meyer), *IPLaw360*, June 23, 2011.

"The 25 Percent Rule in Patent Damages: Dead and Now Buried" (w/ S. Tzenova), NERA Working Paper, June 10, 2011.

"Intellectual Property Valuation Techniques and Issues for the 21st Century," (w/ B. Ray), in *Intellectual Property Strategies for the 21st Century Corporation*, John Wiley and Sons, Inc., 2011.

"Secondary Currency in Circulation: An Empirical Analysis," (w/ M. Colacelli), *Journal of Monetary Economics*, Volume 56, Issue 3, April 2009, pp. 295-308.

"Does the Supreme Court's Decision in *Quanta* Affect Firms' Incentives to Innovate?" (w/ B. Ray and L. Wu), NERA Working Paper, March 2009.

"Words Matter: Economics & A Literal Reading of Mars, American Seating, and Monsanto-Ralph -- Potholes Along the Road to Economic Rationality?" (w/ P. Beutel), NERA Working Paper, March 10, 2009.

Updated: March 11, 2020

"Reasonable Royalties After *eBay*" (w/ C. Meyer), *IPLaw360*, September 24, 2007.

"Where's the Economics Behind Lucent v. Gateway et al.?" (w/ M. Lopez), NERA Working Paper, March 23, 2007, and *Intellectual Property Today*, April 10, 2007.

"On-line Piracy and Recorded Music Sales," Harvard University, 2005 (Working Paper).

"Developing Superstars: The Effects of File Sharing on the Investment in New Talent," Harvard University, 2005 (Working Paper).

"Network Externalities and Copyright Enforcement," *Estudios de Economia*, June 2002, v. 29, iss. 1, pp. 71-88.

Dissertation: "Essays on the Economics of Copying and the Recorded Music Industry," Harvard University, 2005.

Public Presentations

What's a Reasonable Opinion for a Reasonable Royalty?, NERA Insights Webinar, February 2020.

Oh, the Prices You'll Charge! Intra-Molecule Competition and Drug Prices, Antitrust Seminar, NERA Economic Research, La Jolla, California, July 2019.

The Economics of Biosimilar Drugs: New Considerations for Market Access, Sustainable Pricing and Reimbursement Policies, ACI Summit on Biosimilars, June 2019.

Antitrust Enforcement for Pay-For-Delay Settlements: U.S. and E.U. Perspective, The Knowledge Group Webinar, October 2016.

Everything is Opposite on Opposite Day: High Prices Happen to Good People, Antitrust Seminar, NERA Economic Research, Park City, Utah, July 2016.

Red Flags in Patent Settlement Agreements, in Patent Settlement Agreements: Impacts on Antitrust Enforcement - A 2016 Outlook, The Knowledge Group Webinar, May 2016.

What Constitutes a Reverse Payment? The EU and the US, in European Antitrust Enforcement for Pay-for-Delay Settlements, The Knowledge Group Webinar, September 2015.

Updated: March 11, 2020

Economics Fundamentals: Market Definition, ABA Section of Antitrust Law, Economics Committee Brown Bag Series, Washington, DC, January 2015.

Let's All Do the Product Hop: Understanding the Pharma Industry and Product Hopping, Antitrust Seminar, National Economic Research Associates, Santa Fe, New Mexico, July 2014.

Apportionment When There are Several Blocking Patents, Panelist, Litigating Patent Damages: Strategic issues for proving and refuting damages claims, San Francisco, CA, May 2014.

Cutting-Edge Issues in Damages Calculation, Panelist, Patent Infringement Litigation Summit, San Francisco, CA, December 2013.

AT and IP Face the Music, Antitrust Seminar, National Economic Research Associates, Santa Fe, New Mexico, July 2013.

Standard Essential Patents (SEPS) and Your Enforcement Strategy, Moderator, The IP Strategy Summit: Enforcement, Washington, DC, May 2013.

How to Prove Damages in Patent, Trademark and Copyright Cases LIVE Webcast, "How Do Copyright and Trademark Damages Differ from Patent Damages?," The Knowledge Congress Webcast Series, April 2013.

Current Trends in Patent Damages: Apportionment Among Multiple Patents and in Multi-Component Systems, Hogan Lovells, New York, NY, October 2012.

Antitrust Issues in the Strategic Acquisition and Use of Patents, Third Annual Chicago Forum on International Antitrust Issues, Northwestern University, Chicago, IL, June 2012.

Litigating Patent Cases in Different Industries: Night and Day or Shades of Gray?, New York, NY, April 2012.

Behavioral Economics in Antitrust: Puzzling Behavior, Antitrust Seminar, National Economic Research Associates, Santa Fe, New Mexico, July 2011.

An Economic View of the Entire Market Value Rule, Fordham Intellectual Property Law Institute, 19th Annual Conference on Intellectual Property Law & Policy, April 2011.

Reasonable Royalty Damages: The Entire Market Value Rule and Apportionment, New York, NY, November 2009.

Updated: March 11, 2020

Law Seminars International TeleBriefing, *Trends in Federal Circuit Patent Damages Decisions*, September 2009.

International Industrial Organization Conference, Northeastern University, April 2006.

International Industrial Organization Conference, Georgia Tech University, April 2005.

Economics Department Seminar, Northeastern University, March 2005.

Economics Department Seminar, Wesleyan University, March 2005.

Federal Trade Commission, March 2005.

University of Texas-Dallas, Economics Department Seminar, February 2005.

U.S. Department of Justice, February 2005.

Wellesley College, Economics Department Seminar, February 2005.

University of Southern California, Economics Department Seminar, February 2005.

Harvard University, Industrial Organization Seminar, November 2004.

International Industrial Organization Conference, Northwestern University, April 2004.

Fellowships and Awards

Certificate for Excellence in Teaching, Harvard University, 2002-2005

Charles H. Smith Fellowship in Economics, Harvard University

Referee

American Economic Review, *Economic Journal*, *Review of Network Economics*

Updated: March 11, 2020

Materials Considered in Connection with the Declaration of David Blackburn, Ph.D.

Bates Stamped Materials

Start	End
CGI000043139	CGI000043166
CGI000045306	CGI000045306
ILMNBGI_NDCAL0013381	ILMNBGI_NDCAL0013381
ILMNBGI_NDCAL0013382	ILMNBGI_NDCAL0013382
ILMNBGI0023501	ILMNBGI0023502
ILMNBGI0026108	ILMNBGI0026207
ILMNBGI0027157	ILMNBGI0027167
ILMNBGI0027192	ILMNBGI0027195
ILMNBGI0027196	ILMNBGI0027203
ILMNBGI0027204	ILMNBGI0027215
ILMNBGI0027231	ILMNBGI0027237
ILMNBGI0027251	ILMNBGI0027258
ILMNBGI0027259	ILMNBGI0027265
ILMNBGI0027272	ILMNBGI0027294
ILMNBGI0027474	ILMNBGI0027477
ILMNBGI0027478	ILMNBGI0027482
ILMNBGI0029325	ILMNBGI0029326
ILMNBGI0032431	ILMNBGI0032614
ILMNBGI0035907	ILMNBGI0035907
ILMNBGI0038038	ILMNBGI0038038
ILMNBGI0039542	ILMNBGI0039542
ILMNBGI0039544	ILMNBGI0039544
ILMNBGI0042212	ILMNBGI0042221
ILMNBGI0045245	ILMNBGI0045249
ILMNBGI0046453	ILMNBGI0046480
ILMNBGI0046964	ILMNBGI0046964
ILMNBGI0047729	ILMNBGI0047742
ILMNBGI0047960	ILMNBGI0047972
ILMNBGI0048348	ILMNBGI0048348
ILMNBGI0049107	ILMNBGI0049127
ILMNBGI0049791	ILMNBGI0049803
ILMNBGI0049882	ILMNBGI0049882
ILMNBGI0050319	ILMNBGI0050323
ILMNBGI0051028	ILMNBGI0051203
ILMNBGI0052228	ILMNBGI0052233
ILMNBGI0052668	ILMNBGI0052668
ILMNBGI0053690	ILMNBGI0053844
ILMNBGI0056982	ILMNBGI0056987
ILMNBGI0057595	ILMNBGI0057598
ILMNBGI0057651	ILMNBGI0057661
ILMNBGI0093798	ILMNBGI0093798
ILMNBGI0159354	ILMNBGI0159354
ILMNBGI0159483	ILMNBGI0159483
ILMNBGI0166994	ILMNBGI0166994

ILMNBGI0186749	ILMNBGI0186767
ILMNBGI0186768	ILMNBGI0186813
ILMNBGI0186814	ILMNBGI0186832
ILMNBGI0187835	ILMNBGI0187841
ILMNBGI1001548	ILMNBGI1001548
ILMNBGI1011151	ILMNBGI1011160
ILMNBGI1038519	ILMNBGI1038579
ILMNBGI1045078	ILMNBGI1045081
ILMNBGI1046444	ILMNBGI1046452
ILMNBGI1046453	ILMNBGI1046453
ILMNBGI1052089	ILMNBGI1052094
ILMNBGI1059189	ILMNBGI1059189
ILMNBGI1066555	ILMNBGI1066711
ILMNBGI1066976	ILMNBGI1066982
ILMNBGI1070269	ILMNBGI1070328
ILMNBGI1072223	ILMNBGI1072230
ILMNBGI1083993	ILMNBGI1083993
ILMNBGI1084050	ILMNBGI1084066
ILMNBGI1084080	ILMNBGI1084083
ILMNBGI1084117	ILMNBGI1084120
ILMNBGI1084223	ILMNBGI1084231
ILMNBGI1084647	ILMNBGI1084647
ILMNBGI1084680	ILMNBGI1084687
ILMNBGI1084725	ILMNBGI1084730
ILMNBGI1084771	ILMNBGI1084785
ILMNBGI1085299	ILMNBGI1085329
ILMNBGI1085330	ILMNBGI1085357
ILMNBGI1085473	ILMNBGI1085473
ILMNBGI1085474	ILMNBGI1085474
ILMNBGI1085475	ILMNBGI1085488
ILMNBGI1085489	ILMNBGI1085494
ILMNBGI1085512	ILMNBGI1085519
ILMNBGI1085686	ILMNBGI1085749
ILMNBGI1085750	ILMNBGI1085862
ILMNBGI1085863	ILMNBGI1085974
ILMNBGI1085975	ILMNBGI1086087
ILMNBGI1087138	ILMNBGI1087234
ILMNBGI1087235	ILMNBGI1087342
ILMNBGI1087343	ILMNBGI1087425
ILMNBGI1087534	ILMNBGI1087658
ILMNBGI1087740	ILMNBGI1087747
ILMNBGI1088024	ILMNBGI1088131
ILMNBGI1090622	ILMNBGI1090622
ILMNBGI1091086	ILMNBGI1091098
ILMNBGI1091312	ILMNBGI1091312
ILMNBGI1091454	ILMNBGI1091467
ILMNBGI1095401	ILMNBGI1095402
ILMNBGI1098747	ILMNBGI1098747
ILMNBGI1098748	ILMNBGI1098748
ILMNBGI1098749	ILMNBGI1098749

Attachment 2

ILMNBGI1098750	ILMNBGI1098750
ILMNBGI1098751	ILMNBGI1098751
ILMNBGI1098752	ILMNBGI1098752
ILMNBGI1098753	ILMNBGI1098753
ILMNBGI1098754	ILMNBGI1098754
ILMNBGI1098929	ILMNBGI1098933

Case Legal Documents

1. Complaint for Patent Infringement, Jury Trial Demanded, *Illumina, Inc., Illumina Cambridge LTD., v. BGI Genomics Co., LTD., BGI Americas Corp., MGI Tech Co., LTD., and Complete Genomics Inc.*, United States District Court for the Northern District of California, Case No. 20-cv-1465, February 27, 2020
2. Complaint In the Matter of Illumina, Inc. and Pacific Biosciences of California, Inc., Docket No. 9387, United States of America before the Federal Trade Commission, December 17, 2019
3. Declaration of Mark Van Oene in Support of Plaintiffs Illumina, Inc. and Illumina Cambridge LTD.'s Motion for Preliminary Injunction, United States District Court for the Northern District of California, Case No. 3:19-CV-03770-WHO, February 19, 2020
4. Declaration of Mark Van Oene in Support of Plaintiffs Illumina, Inc. and Illumina Cambridge LTD.'s Motion for Preliminary Injunction, United States District Court for the Northern District, Case No. 3:20-CV-01465, February 27, 2020, and accompanying exhibits
5. First Amended Complaint for Patent Infringement, *Illumina, Inc. and Illumina Cambridge LTD., v. BGI Genomics Co., LTD., BGl Americas Corp., MGI Tech Co., LTD., and Complete Genomics Inc.,* U.S. District Court for the Northern District of California, Case No. 3:19-CV-03770-WHO, September 18, 2019
6. Notice of Motion and Memorandum in Support of Plaintiffs Illumina, Inc. and Illumina Cambridge LTD.'s Motion for Preliminary Injunction, *Illumina, Inc., and Illumina Cambridge LTD., v. BGI Genomics Co., LTD., BGl Americas Corp., MGI Tech Co., LTD., and Complete Genomics,* U.S. District Court for the Northern District of California, Case No. 20-cv-01465, February 27, 2020
7. Notice of Motion and Memorandum in Support of Plaintiffs Illumina, Inc. and Illumina Cambridge LTD.'s Motion for Preliminary Injunction, *Illumina, Inc., and Illumina Cambridge LTD., v. BGI* Genomics Co., *LTD., BGl Americas Corp., MGI Tech Co., LTD., and Complete Genomics,* United States District Court for the Northern District of California, Case No. 3:19-cv-03770-WHO, February 19, 2020
8. 207 F. Supp. 3d 1081, Illumina, Inc. v. Qiagen, N.V., No. C 16-0788 WHA, 2016

Depositions

1. Deposition of Mark Van Oene, April 9, 2020

Independently Acquired Materials

1. "About Us," Complete Genomics, available at https://www.completegenomics.com/
2. "Illumina Sequencing Platforms," Illumina, available at https://www.illumina.com/systems/sequencing-platforms.html
3. "Introduction," BGI, available at https://en.genomics.cn/en-about.html
4. "Introduction to NGS, Learn how the technology works and what it can do for you," Illumina, available at https://www.illumina.com/science/technology/next-generation-sequencing.html
5. "MGI Announces Commercial Launch of its CoolMPS™ Chemistry-based DNBSEQ™ Sequencers in the United States," PR Newswire, February 21, 2020, available at https://www.prnewswire.com/news-releases/mgi-announces-commercial-launch-of-its-coolmps-chemistry-based-dnbseq-sequencers-in-the-united-states-301009250.html
6. "MGI Introduction," MGI, available at https://en.mgitech.cn/about/
7. "Qiagen to reorganize around 15-year NGS partnership with Illumina as CEO quits," FierceBiotech,

October 8, 2019, available at https://www.fiercebiotech.com/medtech/illumina-qiagen-ink-15-year-companion-diagnostic-partnership-starting-cancer

8. R. R. Gullapalli et al., "Clinical Integration of Next Generation Sequencing Technology," Clinics in laboratory medicine, Vol. 32, Issue 4 (December 2012)
9. "Sequencing Reagents," MGI, available at https://en.mgitech.cn/products/reagents/2/
10. "Structure," BGI, available at https://en.genomics.cn/en-organ.html
11. "Thermo Fisher Scientific and Illumina Sign Agreement to Provide Research Market Broader Access to Ion AmpliSeq Technology," Illumina, January 8, 2018, available at https://emea.illumina.com/company/news-center/press-releases/2018/2325616.html?langsel=/gb/